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PSYCHOSOMATIC MEDICINE—VOL. III, NO. 4, OCTOBER, 1941

THE EMOTIONAL SETTINGS OF SOME ATTACKS OF URTICARIA*

LEON J. SAUL, M.D., AND CLARENCE BERNSTEIN, JR., M.D.**

INTRODUCTION

IN THINKING of "psychogenic" or "psychological" factors in disease, it is well to bear in mind that we mean the production of physical symptoms by the powerful biological urges which motivate our lives—fear, love, hate, and the forces which drive men to the heights of heroism, accomplishment, and love, and to the depths of despair, to murder, suicide, neurosis, and psychosis. These motivations can best be understood at present by studying their manifestations in thought, fantasy, dreams, and behavior. Under certain conditions, particularly intensification of these drives without adequate expression, they can affect the physiology sufficiently to produce symptoms, in broadly speaking, the cerebral or psychological, the voluntary-muscular, and the vegetative spheres.

The essence of the concept of functional symptoms is that the physiological disturbance is produced not by any damage to the organ but only by a variation in its operation—a change in the balance of forces. This is like the knock in an automobile engine in perfect condition when the car is forced up too steep a hill in high gear. Erythema can be produced by local injury to structure, and also by functional variations, such as response to heat or to certain emotional situations. In certain cases of the latter it is called blushing. It would not be surprising when embarrassment causes blushing if stronger emotions might not produce more severe effects of similar nature like urticaria. There is considerable evidence in the literature that these emotional forces play a rôle in producing urticaria in certain cases. Just what forces or what constellations of them are specifically involved has not been worked out. The present paper is a study of this problem.

REVIEW OF THE LITERATURE

An excellent discussion of aspects of urticaria appears in Sulzberger's "Dermatological Allergy." It is generally accepted that urticaria is a syndrome which comprises various disease entities, probably differing in pathogenesis, some allergic and some not (*25*). It is differentiated from angioneurotic edema with which however it overlaps. In angioneurotic edema there is more involvement of other organs than the skin, (*15*, *17*). There are certain differences between the acute and chronic urticaria. The chief of these is the fact that while specific allergens are usually found as causing the acute urticarias, it is exceptional to find this etiology in the chronic cases, where a great variety of factors may be operative, among them the psychological and endocrinological, (*26*). The case herein described is of the chronic type, with occasional swelling of the throat, and with no definitely ascertainable family history of allergic reactions. Sulzberger is skeptical of the psychological factor: "*Psychic and emotional* influences can *perhaps* elicit urti-

* Expanded from paper read at the annual meeting of the Southern Psychiatric Association, Louisville, Kentucky, October 9, 1939.

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carial attacks, and in many ways perhaps even favor the creation of allergic states and the elicitation of allergic reactions. I have never had the opportunity to observe purely *psychogenic urticarial attacks*, but their existence is reported by many careful observers, such as J. Jadassohn, Sack and others in Europe, and, in America, Stokes, Pillsbury, Kulchar and co-workers, in articles which merit careful reading by all interested in the problem of psychogenic and emotional effects in various dermatoses (Stokes, Kulchar and Pillsbury, Archives of Dermatology and Syphilology, *31*: 470–499, April, 1935)."

The physiological mechanisms are not entirely clarified. Stokes *et al.* review studies of the acid-base equilibrium, the effect of emotion on vasomotor responses, the vagus-sympathetic mechanism, the calcium-potassium balance in relation to this mechanism, the important Lewis "H-substance" theory as a connecting link, the rôle of the antidromic impulse, and so on.

A digest of the papers on emotional factors in urticaria appears in Dunbar's "Emotions and Bodily Changes" (*6*) and in the excellent critical review by Stokes *et al.* (*25*). Recently, Stokes and Beerman (*24*) have published a thorough review of psychosomatic correlations in allergic conditions. Extended bibliographies are to be found in these articles and will not be repeated here. In this literature there are reports, not always carefully controlled, of persons developing urticaria by auto- or hypnotic suggestion upon seeing it in others, or upon erroneously believing that they had eaten a food to which they were sensitive. It is common for patients to observe that their attacks are precipitated by emotional disturbances. The case reports show the occurrence of urticarial attacks in a great variety of emotional situations, including anger, overwork, or overexertion, frequently under pressure to excel, and situations in which sexual wishes are aroused but frustrated, and very many other circumstances. For example, quoting a small bit of the literature reviewed by Stokes *et al.* (*25*): " . . . In Dufke's case, urticaria of the face, neck and arms developed when silk was hung around the patient's neck. When linen was applied, nothing occurred until she was told that the linen was silk, whereupon the eruption developed. Flandin's three typical cases included that of a medical student in whom urticaria developed with each examination, that of a young man allergically sensitive to strawberries and fish in whom urticaria also developed with any violent emotion and that of a woman whose emotional outbursts were followed by asthma and urticaria.

"Kreibich and Sobotka 'suggested' successfully to a patient the appearance of urticaria on the trunk. Mayr observed an English physician who could 'suggest' wheals on any portion of his body. Klauder described a woman who had persistent urticaria under physical and nervous tension, responsive to psychotherapy, and a convict in whom urticaria developed each day when he was locked in his cell at 5 p.m. and who recovered under psychotherapy. Schamberg described urticaria in a manufacturer following emotional shock on watching his factory burn down." There is not sufficient consistency in the many reports to bring out any constant personality type or specific emotional state associated with urticaria. However, a series of 100 cases was studied by Stokes, Kulchar, and Pillsbury, and led the authors to the conclusion that " . . . the driving, high tension, competitive personality, keyed to high pitch and perpetually intent on destination, achieved at no matter what expense, is the urticariogenic personality. . . ." (*25*).

Turning to the psychoanalytic litera-

ture, there are reports of patients seen in interviews, but no analyzed cases. Oberndorf (*17*) in 1912 published observations on the disappearance of angioneurotic edema after appendectomy. W. C. Menninger and J. Kemp (*16*) report on a man seen in interview whose urticaria occurred after breaking off with a girl with whom he went for six months, indulging in intimacies, but unable to bring himself to having intercourse. The patient connected the attack with "his sexual continence in the face of the repeated sexual excitement with this girl." Also, at this time his brother became ill and he dreaded the possibility of his having to take the responsibility of his family. He relinquished outdoor athletics as these stimulated the rash. The authors point out the occurrence of the rash when he was threatened with the necessity to prove his manhood. Lorand's (*14*) case seen in interviews is strikingly similar in psychological structure to the one herein to be reported. Her urticaria occurred following an accident, at the point when she was to leave home for a vacation. The chief similarities are the close, highly sexualized attachment to her father, the keen rivalry with a younger sister whom the mother favored, the very inhibited sexuality, the protracted period of uncertainty about marrying, and the very masochistic dreams, which in this case, however, apparently had a special relationship to the accident. Graf-Best (*10*) has reported the case of a woman who was in the situation of having remarried and being very jealous of her second husband's deceased wife and of the stepson. The analysis was interrupted after fourteen interviews by which time the urticaria was gone. So far as I know, no psychoanalyzed case of urticaria has been published. It is hoped, therefore, that the following report will add something through a description of the emotional states of the patient at those times when her urticarial attacks occurred.

Methodology

Urticaria is a symptom of a kind which may well result from tendencies in an individual which are reflected in his personality make-up. But functional organic symptoms are often manifestations of particular emotional tensions in an individual rather than of his total personality make-up, (*3*). The same psychogenic symptoms may occur in individuals with diverse personalities which are similar only insofar as they have in common the one emotional tension or constellation which is manifested in the symptom. Moreover, most patients have a number of symptoms so that a description of the personality does not of itself yield the specific emotional factor. Because an individual has a particular organic symptom and also certain personality trends, it does not follow that the two are causally related. Such correlations are only significant where a large series is available; for example, the 100 cases of Stokes, Kulchar, and Pillsbury (*23*). The present study is a detailed investigation of a single case in a search for specific emotional factors. Therefore, it will focus not upon the details of the patient's personality structure but upon her emotional states at the time of her urticarial attacks.[1]

Chief Complaints and Medical History

Miss Q., a pleasant, somewhat obese young woman in her middle twenties, with a persistent, severe, generalized urticaria especially about the face and eyes, gave a history which was not typical of a reaction to any commonly

[1] This method was developed by Thomas French in studying asthma (*8*).

recognized specific allergen, nor was any clue discovered by an exhaustive allergic work-up, including extensive skin tests, elimination diets, allergen free room, eosinophile count, and so on. The following are excerpts from the allergist's report:[2]

> The patient reached me through a general physician to whom she was sent because of generalized urticaria, especially about the face and eyes, presumably related to a sinus infection. . . . From our angle there was nothing specifically allergic in her story that could be related to any physical contactant, ingestant, or inhalant.
>
> The physical findings were of little assistance. The temperature was occasionally 99.0. . . . Blood pressure 110 to 120/66 to 70.
>
> Our impression was and has been 'psychogenic (!) urticaria.' Trial at hospitalization, and later a sojourn in Miami resulted in unsustained improvement. . . . Other methods were used: ergotamine tartrate, parathormone, thermal baths and turkish rubs—all to no real avail, and really marking time until analysis could be started.
>
> It was never felt that she was at any time in the 'basal state' either for metabolic assay, or as regards her skin. However, in order to make our survey complete the tests were done, intradermally, with the following very DUBIOUS 'positives': TWO PLUS, pecan; ozite. ONE PLUS, potato, apple, kapok, rabbit hair, almond, celery, cantaloupe, date, watermelon, cottonseed, broccoli. PLUS-MINUS, oat, cauliflower, house dust, prune.
>
> The laboratory findings are in no way remarkable. She was completely studied during her admission to Michael Reese Hospital. . . . The blood showed no eosinophilia, nor did the nasal smears. The stools were negative for blood and parasites. . . .

On the other hand, she was upset emotionally. Her very incomplete family history gave no evidence of allergies, nor had she had any herself. In her early years, besides the childhood diseases, she had two severe accidents and was enuretic for one year while at an orphan's home. In addition to the urticaria she suffered from migrainous headaches, dysmenorrhea, bulimic tendencies, feelings of incompetence, nightmares, and anxieties. She attributed all her current complaints to her nervousness. The analysis brought out emotional connections with these other symptoms but they will not be discussed in this paper.

LIFE EXPERIENCES AND REACTIONS TO THEM

The patient gave the following history. Her mother divorced in order to marry the father when both were not yet twenty. When the patient was one and a half her sister was born, and when she was two, her mother died owing, it was rumored, to violence from the father. The father then married a divorcee and the children were placed in separate orphan homes when the patient was four. A year later, in 1917, he took them back in order to avoid the draft. He was always engaged in illicit or shady enterprises and served several prison terms. The patient was well treated by the stepmother until the age of six. Then the stepmother began to accuse her of things she never did, for example, scratching the furniture, and would get the father to force a confession. This he did by cruel treatment with a sexual tinge. He stripped her and burned her with a poker, held her under water in the bathtub, forced her out into the cold scantily clad, and so on. This, she complained, was the only kind of attention she received from him.[3] He never took her on his lap or was otherwise affectionate toward her. As soon

[2] Dr. Clarence Bernstein, an allergist, was responsible for the patient's allergic work-up and for following her allergically during her psychoanalysis by Dr. Leon J. Saul who was responsible for the psychological aspects of the case.

[3] It is possible that the patient unconsciously colored her history masochistically as discussed on pages 361–362.

as the children could help, they were put to doing charwork in the father's saloon and brothel. They knew abuse and drudgery, and the ostracism of the neighborhood and almost no pleasure. They longed for a good mother and a good father. Exposed to violence and promiscuous sexuality, they were forbidden all companionship with boys by the suspicious parents, who constantly accused them of sexual misbehavior and who threatened to shoot them and any boy they might be seen with. At the age of about eleven, the patient made three suicidal attempts.[4] At twelve, she succeeded in getting a job in a nearby city. With her first salary, she bought ice cream and consumed all she could possibly eat. Through hard work, she brought the sister to live with her and helped her through school. The patient did well at secretarial work and helped the sister until the latter's marriage at the age of 22. The patient was then even more miserably lonesome. She was befriended by a girl her own age, Miss N., who took her to live in her own poor and emotionally tense family. About this time the patient began going with a young man her own age upon whom she became dependent for male companionship, but who made no sexual advances, and who, despite his abilities and his intentions of marriage, was perpetually unable to find a position which would have made the marriage possible.

The patient reacted against her early sordid, sensual environment by constant but only partially successful struggles to rise above it. She daydreamed of fairy princes, love, and dancing at gay restaurants, and strove strenuously, but inhibitedly, to improve herself through night school, dramatics and discussion groups, and the like. But in her dreams she was often back in poverty, being attacked by a cruel man who clearly represented her father. She tried to break completely with her father, but could not. She was dependent on him emotionally, hated, feared, loved, and pitied him. Because of her masochistic dependence on him she was sexually repressed and frigid, and for three years preceding the urticaria, was engaged to the above mentioned boy, who made no sexual advances and never succeeded in finding a job which would have enabled them to marry.

Throughout the analysis she had not a single directly sexual dream. Her sexual wishes appeared only in an extremely masochistic and almost never gratified form, such as being chased by a man with a gun or a big stick. The men were usually thinly disguised representatives of the father. Her extreme fear of sexuality was due to the severe repressiveness of her sexual training, to her concept, based on her early experience, of sexuality as something degraded, and more important, to guilt from her own hostilities to her sister, step-mother and father. Moreover, during the analysis, she had not a single dream concerning impregnation. This degree of sexual repression led Dr. Therese Benedek to suspect that she had an infantile uterus—a prediction confirmed by gynecological examination by Dr. Marie Wessels. She identified herself with her sister and covered her hostility to her with an oversolicitous, self-sacrificing helpfulness. She hated her stepmother but only partially, for she longed for her love—the love of a good mother. Her deepest wish, judging by her frequently recurring dream, which began in earliest childhood, was for a good mother, actually for her con-

[4] At least one of these was serious. This was by cutting her arm and wrist necessitating five stitches. Previously she had attempted suicide by drinking hydrogen peroxide, and on another occasion by swallowing a bottle of black pills. At three, she fell through a trap door fracturing her leg, and still carries a scar of a gash on her leg which occurred when she fell while jumping at the age of ten.

cept of her own mother whom she had lost at the age of two.

The patient's Cinderella-like history reveals a childhood of drudgery and abuse in sordid surroundings, with no pleasure or escape except in daydreams of love and romance. Grown to womanhood, she retained these intense longings of her childhood but was unable to satisfy them through a normal sexual life, because of her fears.

She dreamed of a man with a high hat and a beard, very understanding and helpful, but who could never marry because his legs were paralyzed. And in life she became attached to such a man —one who gave her companionship and understanding and who made no sexual advances. When her perpetually frustrated longings were increased, either internally through the endocrinological changes of her menstrual cycle, or externally by some stimulation and disappointment, then she would become upset, frequently eat uncontrollably, be irritable, develop migrainous headaches, and also weep, or else, as we shall see, break out with hives.

PSYCHOLOGICAL SETTING OF MAJOR URTICARIAL ATTACK

The patient's severe generalized attack of urticaria occurred several years ago just before Christmas, on December the 17th, after mild manifestations for three weeks. She had been overworking and in addition trying to keep up with outside study and dramatics groups. The engagement of Miss N., the girl who had taken the patient into her family, led the patient to leave them at the end of October to take a room alone.[5] Just then her father married a young lady the age of the patient's sister and went to a distant city. Only two human contacts remained for this girl, whose cravings for love were intensified by her loneliness and overexertions. One was her inhibited boy friend who could never find a job. The other was an independent girl at the office upon whom the patient leaned. This girl, Miss. A., now decided to leave town to be with her father in a neighboring town, her mother being dead, and invited the patient to come with her for Christmas. The patient envied her intensely for having a good father to go to. Also at this time, the patient felt she should no longer wait for her boy friend but should break off with him, despite her dependence upon him. *Thus her last human contacts were threatened.* It was at this point, the end of November, that the first swellings appeared, chiefly on her forehead, eyes, and lips. A few weeks later, after a day of overwork organizing an office party, on the verge of the departure of Miss A., the independent girl, and following a fight with the boy friend, she broke out in a generalized urticaria so severe that she was in the hospital for three weeks and away from work for six months. It thus began *when her extreme cravings for love, intensified by her overexertions, were on the verge of total frustration, through separation from those persons upon whom she was emotionally dependent.*

The patient improved markedly in May when she was referred for analysis and was assured of treatment in the fall, and she returned to work a few days after the interview. The urticaria recurred in mild form on and off throughout the summer, along with her severe headaches, and subsided further when her analysis was begun in the fall. Apparently it was mitigated by the prospect of the care of a physician (who, as was seen later, meant to her a sub-

[5] This was many weeks before the onset of the urticaria, the course of which was unaffected by changing her living quarters twice. The allergist considered that this ruled out the local environment as a possible source of allergens, particularly since the hives persisted unabated in an allergen-free hospital room.

stitute for her father who had gone off and married). It disappeared, except for minor recrudescences, upon entering the analytic situation. The following is a description of the emotional settings of these recrudescences.

URTICARIAL ATTACKS DURING ANALYSIS

1. At the first interview (sitting) on October 5th, the patient spoke of how anxious she was for analysis, how she envied other children for having mothers, her expectation of marrying when her fiance found a job, how inferior she felt about her education and her father being a bootlegger, and how she hoped for help, having always helped others without thought of reward. The main theme was her thwarted wish for love and help. Practical details concerning analysis were discussed with her, including the fact that an analysis begins with a trial period. The next day she reported that she was very upset for three hours after this interview, and that her face swelled far more than usual and even today was somewhat swollen. She felt she could not free associate but knew that if she did not she could not be helped. Her worst fear, she said, was that through her incompetence she would lose her job. This was interpreted to her as her reaction toward the analysis. Discussion with her brought out the fact that her expectations toward the analysis were aroused but that she feared that she would not do well what was expected during the trial period and would be sent away. She felt relieved by this discussion. The urticaria decreased markedly that day and did not recur in severe form until a week later. (These longings of which she spoke, threatened with further frustration by separation from the persons to whom she directed them, is what we observed in the setting of the onset of the urticaria the preceding December.)

2. A week later, October 12th, she came in with her upper lip swollen and reported that she found it to be so on awakening. During the night she had *dreamed:* "Father came to the office to say goodbye." She went on to say that she always feared doctors and was ashamed to tell them things. She then told of her father's marriage to the mother, his reputed violence to her, his cruelty toward the patient, at the instigation of the accusing stepmother, to make the patient confess, and his sending her away to an orphanage. From the associations, the dream seems to indicate the patient's longing for her father, but also her wish for him to leave. She was reacting to the analyst with a pattern she had toward her father, as though the analysis was like the confession situations of childhood. She wanted the analyst's help and love but feared that, like her father, he would punish her and send her away. Again we see that the urticaria appeared when her longings and expectations, in this case toward the analyst, were aroused but threatened with frustration.

3. Monday through Wednesday, October 25th to 27th, the first days of her menstrual period, she was away because of severe headaches and an eruption of urticaria all over her body. She came on Thursday, the 28th, her face swollen. She spoke entirely of her dissatisfaction and doubts about her platonic boy friend who, after three years, was still unable to find a job and give her the kind of marriage she wanted. She complained that he would not have made a good doctor, thereby implying that she would like to marry a doctor, more specifically that she was dissatisfied with her fiance and would prefer to marry the analyst. Again the urticaria occurred in a setting of intensified unsatified longing, probably increased endocrinologically at this point in her menstrual cycle.

That afternoon (she reported the next day), she wept for hours, and then felt better. At the next session, two days later, she felt fine and her symptoms had disappeared. Her urticaria regularly terminated with weeping, as though the weeping acted as a sort of safety valve. When she wept freely her urticaria subsided.

4. Over a month later, on November 17th, the patient reported that for the preceding weeks she had awakened almost every night sobbing, her pillow drenched with tears. This was always following a repetitive *dream* which recurred since early childhood—a long dream of which she could only remember the endings, that some object she had set her heart on slipped away through her fingers just as she was grasping it, leaving her terribly disappointed. Sometimes it was a figure in a white flowing robe. The object reminded her of her "wishes and ambitions, air castles which had not come true." She thought the figure was her mother, and that this repetitive dream reflected her childhood longing for the maternal affection that she had missed. Now, she said, she again felt that she was reaching for someone she could not get. She then spoke of the intensity of her cravings for romance and their invariable disappointment. At adolescence she saw other girls go out on dates and parties, while the patient was not allowed to, even at sixteen, although she simply craved to. At fourteen, she had a bad case of puppy love for a boy of sixteen, but when he talked to the patient, she ran away. At fourteen, she yearned to be kissed by a boy she was in love with, but when he tried to, she kicked and scratched, and thought that if she did, she would be a bad girl and have a baby. Books and movies made her imagination run wild. Her unsatisfied wishes were overly strong, she said, because as a child she never got the affection she craved. It is clear that these internally frustrated sexual wishes were now directed toward the analyst, and that at their nucleus was her yearning for the love and affection of a good mother. She wished to satisfy these yearnings through a sexual relationship with a man, but was unable to because of her fears.

Two days later, November 19th, she said that for the past days she had developed headaches while on the analytic couch, and that after each hour there was some swelling of her face, especially her eyes, and sometimes her lips. Thus nights she wept because of her frustrated wishes while in the analysis she did not weep but developed urticaria. It is interesting and suggestive that she spoke of weeping and of kisses, and the urticaria was chiefly of her eyes and lips. She was puzzled at being worse again, since now she was not very busy at work and was conscious of no emotional upset.

The urticaria persisted for two days longer. It was gone on the third day, Sunday. Later on Sunday she walked out of the home of her boy friend in fury because he lay down after dinner to sleep while she saw the girl next door being taken out for a date in a big car. The boy friend called to her but she would not go back because she would have burst into tears. At home, she wept for four hours, and developed a severe headache, but no hives.

5. On January 7th, she told that she awoke with hives from a *dream* that another girl's work was in a basket with the patient's, and the patient could not tell which was which. The patient said she would help the girl, who was crying, but was so nervous that she was of no real help. In reality, she said, this girl was the new one at the office. She was motherless like the patient, then her father died, leaving her penniless, and now her boy friend had died. The pa-

tient sympathized with her completely and tried unsuccessfully to get help for her from one of the women bosses. The patient became angered at this boss for her refusal of help. This dream is a reproach against the analyst for not helping the patient. In it, she identifies herself with this other lonely, longing girl, and takes the same compensatory protective attitude she had toward her sister. She demands for the girl, and tries unsuccessfully to give her what the patient wants for herself. Her longing and frustration are self evident from the dream and associations. I wondered why this other girl, capable of evoking such a close identification—their work in the basket was indistinguishable—did not develop urticaria. Inquiry revealed that when she lost her father and boy friend, she actually was incapacitated by a severe generalized urticaria. This was striking, but it may of course be only a coincidence.

6. On January 18th, she reported three *dreams:* The first was about a man who was shot. The second was about traveling. The third was her repetitive dream of reaching for something which slipped through her hand. Omitting further material, the dreams showed the patient's anger at her father, now at the analyst, because of her frustrated wishes and her feeling that because of her anger she would be sent away (traveling) and lose him entirely—the satisfaction slipping through her fingers. She awoke not weeping as previously following the repetitive dream, but with hives.

7. On January 19th, the patient awoke with a few hives widely distributed. That night she had *dreamed* that Miss A., the girl who the preceding Christmas had invited her to visit her and her father in a neighboring town and whom the patient liked very much, repeated this invitation. The patient was very anxious to go but on the way to the station remembered an engagement with an elderly woman and at the very last minute did not go, and the girl was angry. Again last minute frustration.

After January, the patient had no more urticaria until the following fall, although she sometimes itched.

8. On November 3rd, the hour of the preceding day having been cancelled by the analyst, the patient had "just a few hives" on her chest and right thigh. She reported that the day before her boy friend had just failed to obtain a position which would have enabled them to marry. All that afternoon the patient was upset, and struggled to keep from crying. She did not cry but thought she would have felt much better if she had. We again see the urticaria following frustration—by her fiance and by the analyst. Also there is no weeping but this time we know there is an impulse to do so, which is suppressed.[6]

[6] That these relatively mild frustrations resulted in so severe a reaction can be accounted for by their coming at a time when the patient's desires were heightened endocrinologically in her menstrual cycle. That she was in such a state at this time was concluded entirely independently by Benedek and Rubenstein (*4, 5*) as she was one of the cases in their series (*5*). Urticaria occurred during three of the eight menstrual cycles studied by Benedek and Rubenstein in this patient. Each time it occurred just following increased estrone and progesterone production, with parallel heightened heterosexual desire and general longings (as is characteristic of the ovulative period). The frustration of these desires and longings in life was followed by a sharp fall in the hormone level, as they found regularly in other cases. The urticaria occurred at this time of frustration and fall in hormone level, as shown by study of the day by day analytic material and vaginal smears. (Seventy-five per cent cornified cells, indicator of hormone production, was the highest observed in this case, *i.e.*, her average hormone level was lower than the average.) The connection between the patient's sexual desires and bulimic episodes, is shown by the following incident. Her craving for food during these bulimic episodes was beyond control and she would often eat candy all day for two days. Being invited to a meal and seeing a table set with food so excited her emotionally that she could barely restrain herself. She was very anxious about having a gynecological examination even by a woman physician, but went through it without feeling

9. On November 9th, the patient *dreamed* that she was married to a man who looked like her father. He slit her throat so she could not tell something, threw her down the stairs from the attic to get rid of her, and then ran away as the patient tried to yell. The patient thought that even though dead she would haunt him. At the end of the dream it flashed through the patient's mind that this was a punishment for something that she had never dared tell the analyst, namely, that in childhood she and the little girl next door experimented with each other sexually. We see here that she feared to confess her sexual impulses lest the analyst punish her as her father threatened to do and get rid of her. Interestingly enough, this time the urticarial swelling was in her *throat,* which she dreamed was cut—just as previously, material about weeping and kissing was followed by urticaria of the eyes and lip.

10. On May 23rd, after several days of anticipation, Miss A., the independent girl who had invited the patient to visit her the Christmas the urticaria began, arrived in town. The patient eagerly anticipated this visit for days and was terribly disappointed that she did not get all the attention from Miss A. that she expected. When she retired that night, she wept. Then, she felt her lips to be swollen and got up to find that they were, and her eyes also. This was the only occasion on which weeping and urticaria occurred simultaneously. Possibly the weeping was not adequate as a safety valve. She was sensitive at this period because of another, deeper frustration—the ending of the analysis in a few weeks.[7]

11. On October 29th, the patient's fiance actually got a position, and urged her to marry him. But the position was a very poor and menial one, not at all in line with his ambitions, and in tragic contrast to the patient's dreams and expectations. She would even have to continue working. Urticarial swelling of the right eye occurred that evening and was followed by a *dream* in which she was to marry a young blond man, not her fiance, but in the end gave him up and was to marry the fiance. Associating, she said the analyst was not blond, and recalled that the preceding week she had *dreamed* directly that it was the analyst whom she was to marry. Now her marriage meant to her giving up her hopes of marrying the analyst and all the hopes that he had come to symbolize.

12. On January 17th, she reported a *dream* in which her fiance's mother brought her a wool suit in which to be married. The patient refused it and went to get the blue street dress she had decided upon for the occasion. But at the shop they did not have the dress and she was terribly disappointed. In associating, she said that she had given up the idea of having a white bridal costume, and felt that she must be satisfied with something practical. She did not like associating to blue because it made her afraid that she was really depressed about the prospect of her marriage, and went on to talk of a friend of hers who married a doctor—a wish of

emotionally disturbed. After it, she walked down the street thinking how foolish she had been to fear it. Without realizing what she was doing, she entered a restaurant and consumed a large quantity of food. She only realized what she had been doing upon leaving the restaurant. These fugue-like eating episodes often happened to her, she said. That night she *dreamed* of marrying a "well-liked villain" who broke into a store with a key that fitted the door. Thus unable, because of her fears, to satisfy her cravings by genital sexual relations, she relieved them by passionate eating. She indulged excessively orally because she could not indulge genitally. An illuminating study of bulimia will appear in the monograph of Benedek and Rubenstein.

[7] And also because of being in the phase of high hormone level in her menstrual cycle, with consequent heightening of libidinal desires, as revealed later by the independent study of Benedek and Rubenstein. (See footnote page 353).

the patient's toward the analyst which now faced frustration.

At times, the patient had itching and redness, but no urticaria. This usually occurred the few days or week before her period and sometimes during it. The difference between her psychological state during the urticaria as opposed to the itching and erythema may not be only quantitative, since the patient's dreams at these latter times showed slightly less direct frustration and much more prominent exhibitionistic and hostile tendencies than did those connected with the urticaria. The following are examples:

1. On Friday, January the 13th, following severe itching of her back, the patient had a long *nightmare* in which she was nearly attacked by a crowd while eating with her fiance, and which ended with the patient pinching the arm of a girl in a white satin dancer's costume who was looking longingly inside of a night club. The patient was very angry at her for trying to show that she was a goody-goody, when really she wanted to enter this place to dance or sing. The repressed and frustrated desires and exhibitionism are clearly seen at the end of the dream.

2. On Thursday, February the 2nd, when the patient was just getting over her menstrual period, she reported that for the past days she had been in a terrible mood, as was usual for her premenstrually. She had been angry at her fiance, and her skin itched and was irritated. The preceding night she had *dreamed* that as she and her fiance were singing before an audience, her belt and dress fell off. There was also something about her father being shot—or only wanting to stay in bed. (The analyst had cancelled the hour the day before.) These two dreams show the prominence of the exhibitionism in connection with erythema and itching, but the material is meager and this aspect of the problem has not been systematically studied.

Discussion

General features in this patient's personality which were more prominent than in the average case, were tension, masochism, repressed exhibitionism, frustrated longings, and repression of sexual wishes. The emotional settings of twelve flare-ups of urticaria have been observed, eight of them with dreams. The patient saw the allergist, Dr. Clarence Bernstein, frequently throughout her analysis, and at no time was he able to discover any specific allergens related to the attacks. On the other hand, the emotional states of the patient at these times were remarkably similar. Every attack of urticaria, without exception, occurred in an identical emotional situation—*when intense longings were aroused but were in the very moment of frustration.* The onset occurred when the patient felt on the verge of frustration in all of her human relations, and in particular, by the marriage and departure of her father. Attacks not associated with dreams occurred when, at the beginning of the analysis, her hopes and expectations were aroused but she feared that she would not be allowed to continue, when her desires and frustrations were increased in connection with her menstrual cycle, when she did not get all the direct help and gratification she expected, and when her wishes toward the analyst were thwarted by interruptions of the analysis, and by the prospects of an unsatisfying marriage. In all of these situations, libidinal wishes were aroused but frustrated. The dreams which occurred in connection with the eight other attacks reveal further details of the patient's emotional state at these times. The main theme in these dreams is also always: "Almost but not quite." Or, "so near but yet so far." In the

dreams, father comes, but to say goodbye; as she grasps for mother's love or for romance, it slips through her fingers; a poor girl who has lost her near ones is almost, but not quite, getting helped by her; she is anxious to visit a girl and her father but at the last minute does not; she is married to a man who deserts her; she is to marry the analyst but it is called off; she goes for a blue dress but it is not there. The common element in all of these dreams is readily apparent. They all show the patient in the very moment in which strong libidinal wishes are aroused and frustrated, as in her typical repetitive dream.[8]

Of a total of 94 dreams during her analysis, the non-urticaria dreams were either not frustration dreams or else the frustration was not in just this status. She did not have a single reported dream of just this type which was not associated with either urticaria or weeping. Conversely, she never reported urticaria associated with a different type of dream. For example, when she had a dream that her father returned, this time to stay, she had no urticaria. In such work, one is of course dependent upon the patient's reports. She could not have been influenced, however, as I did not discuss the attacks with her until after the analysis.

The following are examples of dreams of different type or status than those described in association with the urticaria attacks. The critical point is the status of the frustration, if present, at the *ending* of the dream.

Dream: Dreamed of father, that they came back, had no money, and stayed with me and my sister, and we all got into a heated argument.

Dream: I was chosen to carry out some plot, to kill someone, or something like that.

Dream: I was on a bus. There was an older couple, a very fat girl, a nice looking girl, and a fellow. His parents introduced him to the fat girl. I thought that they wanted him to marry the other one—maybe as a test. Then time elapsed. He was going with the fat girl but was going to marry the other girl, and the fat girl was very upset. Then I was going into a grocery store and said it wasn't fair what they were doing to this girl. On the way out he let me take a lot of cookies. I wanted to be thinner but they tasted so good, and I took a whole lot of them. Then I was walking down a dark street.

Dream: I was being chased by a man who shot a gun at me and I awoke in terrific fear.

Dream: Something about the office—something was wrong about the travel expense accounts.

Dream: a) I was writing a book and was pleased because the words came easily, just flowed, and I wrote and wrote and wrote.

b) I was going to join a group and put on plays. Then I was walking down a road, asking a man about dramatic art in this district, about the instructors, their methods of teaching, etc. Also something about Wednesday which is Washington's Birthday.

When we use other cases as controls, we find a similarity in the structure and dreams of this case and the asthma series (*8*), insofar as the longing is prominent. In the asthma cases, the underlying longing for the mother was a uniform finding. In contrast are the dreams of, for example, the blood pressure cases which were associated with elevations of the blood pressure (*2*, *20*). In these, although there may be frustration, last minute frustration is not the central feature. What is central is hostility, fear and paralysis of action. This, of course, does not mean that an individual with hypertension can not

[8] So much importance is attached to the dreams because they provide the most intimate sample of the psychic life, analogous to laboratory samples of blood, urine, etc. Once thought to be chaotic, they actually reveal characteristic patterns for each person. See for example Hitschmann (*11*, *12*); also the author (*21*).

have urticaria (although it has been noted that allergic symptoms and hypertension do not commonly occur in the same person, *22*). In such a case, one would expect both kinds of dreams, respectively associated with either urticarial attacks or elevations in blood pressure.

The content of the frustrated desires is apparent from the settings of the attacks which have been described. They were of the nature of the longings of a child for the love of its parents. The patient could not satisfy her longings for love by a normal sexual relationship to a man because of the severity of her masochistic fears. When the longings and their frustration were sufficiently exacerbated by external disappointments or by endocrinological increase of these unsatisfied desires, then if she did not weep, urticaria would develop.

The objection may be raised that the patient had experienced frustrations previously in life without developing urticaria. The answer for the present must be the same as for any functional symptom, namely, the quantitative factor. The tension must reach a certain point before the symptom appears.

At the time of the onset of the urticaria, the patient was exerting herself excessively in work and self-improvement. This overexertion has been observed at the time of onset in many cases, and is reported in the literature. There is little doubt that it bears some relationship to the urticaria. But the common feature in the settings of the attacks described above was the status of the frustrated longings, and not the exertion. The latter was referred to in only one dream (see attack number 5) and some of the attacks occurred when the patient was taking things quite easy. The overexertion, in this case, was in part itself a symptom of the state of frustration like the urticaria (as a flight into activity to escape her feelings of inadequacy and frustration), and in part bore an etiological relationship to the symptom in that the harder the patient drove herself, the more intense were her longings for the opposite —ease, pleasure and love. Thus the overexertion increased the longings and feelings of frustration.[9]

It has also been observed that some persons develop urticaria when they become angry. However, in this case the anger was not related to the urticaria directly but appeared as a reaction to the frustration which was the critical element. (This patient reacted to anger somewhat as she did to overexertion, in that when she became angry, she usually did not express it directly, but retreated to a passive masochistic attitude.)

The need to excel, noted in the literature, was also a feature of this case, in which it was a reaction not only against her repudiated early social position, but also, and more important, a reaction to her childish masochistic longings. By it, she sought at once to escape these, and also to win love, admiration and acceptance.

Thus those correlations reported in the literature of urticaria with tension, anger, overwork, pressure to excel, masochism, and frustrated sexual wishes, were confirmed by the detailed study of this case, all being parts of an emotional constellation in which frustrated longing was central.

It must be especially noted that this frustration was essentially neurotic, that is, internally determined. What-

[9] The physiological mechanism of urticaria is complex and not entirely known. If it is essentially parasympathetic in mediation, being relieved by adrenalin, then the occurrence of urticaria when increased demands are made on the patient would place it in the category of regressive responses, as described by Alexander (*1*). In these cases, demands for exertion result in discharge of excitation not via the sympathetico-adrenal system as normally but via the parasympathetics, signifying a retreat from effort.

ever frustrations and deprivations this patient was subjected to by external situations beyond her control, in her adult life she caused the major part of them herself. Although an attractive girl, she shunned various eligible young men and became attached to a man who made no sexual advances and for years could not find a job or decide to marry her. And even in her dreams she could not permit herself the gratifications she desired. The chief reason she was so self-frustrated was the common one—guilt. The guilt was due to various causes, chiefly hostilities against her sister and her stepmother, and also her father (oedipus guilt). It was this which caused her masochism, that is, her deep need to suffer. This was seen in all aspects of her life, in her overwork, her self-denial, her self-sacrifice, her self-depreciation, and her self-frustration. It was seen in her dreams of being attacked. And in connection with the urticaria it was seen in her Tantalus reaction of frustrating herself on the verge of gratification, and even conjuring up this situation in her dreams. Indeed this need for suffering raises the suspicion not only that she provoked many of her cruel punishments in childhood but that her story of her past brutal treatment may be unconsciously retrospectively colored by her masochism as commonly occurs in such cases, and that her father and stepmother however cruel may not have been quite such fiends as she remembers and pictures them. Certainly guilt and consequent masochistic suffering and self-frustration was a central feature of her personality as it was in a second analyzed case.

Weeping bore a special reciprocal relationship to the urticaria in this case. It relieved the patient's disappointment and anger. When she wept she did not have urticaria, and the attacks usually terminated with weeping. Conversely, when she suppressed her weeping, she developed urticaria. Her repetitive dream would terminate in either weeping or urticaria. She said that the urticarial swelling of her eyes felt as though she "had cried a lot and could cry no more," as though she literally "could feel the tears back there."

This observation led to an illuminating clinical experiment with a girl seen at the Cook County Hospital. This girl of twenty-six felt unable to get along in Chicago, and longed to return to her home in a distant town. She dared not return, however, because of having an illegitimate child of three and a half months. She wept during the interview and when I asked her how long she had been doing so, she replied, to my astonishment, "Three and a half months, since the birth of the child." I suggested to the resident, Dr. Paul Rosenfels, that if she were forbidden to weep, she might develop urticaria. A week later he told me the following: that evening he told her that if she wept so much she might be found committable. She stopped entirely, and in the morning she had a generalized urticaria, chiefly of her chest, back, and arms. After several days he told her that a good cry might make her feel better. She replied: "You seem to want me to cry—but I don't feel like it any more." The following morning, mirabile dictu, he observed that the rash was gone.

Five cases, seen only in interview, provide confirmatory material, although they were apparently of the acute type. One of these warrants mention. A young woman had a generalized urticaria at seventeen—which was when she left home for the first time to take a position. This was ten years ago, and she had no allergic manifestations in the interim. But recently she awoke with a mild urticarial swelling of her face. Inquiry revealed that she had been *dreaming* as follows: She went to

see a man at his home, but when she arrived there he was gone.

Another clear example is the following: A young lady of sixteen had had urticaria occasionally in childhood. It was thought to be a reaction to fish. However, it occurred on several occasions when she had not eaten fish and she sometimes ate fish without having urticaria. She had had no attacks since childhood until the one about to be described. Several months previously she had left her home in Chicago to attend college in the east. This was her first time away from home. At Easter the other girls all received Easter eggs from their parents, but the patient did not receive any. She telephoned home long distance but was hardly able to talk on the telephone. Both of her parents tried to speak with her and later remarked to each other that her difficulty in talking was obviously due to the fact that she was holding back her tears at not having been sent the Easter egg. Two days later they received a letter from her saying that after this phone call, for the first time since childhood, her urticaria had recurred.

Since writing this communication a year and a half ago, I have had the opportunity of analyzing a young woman with a severe generalized urticaria, which had recurred every few weeks for thirteen years. This analysis confirmed the present findings. The patient was closely similar to Miss Q. in pertinent respects, including certain personality trends, her state of frustration (she, too, had a boy friend who could not make up his mind to marry her), and the emotional settings of her urticarial attacks. She, too, was seen in the spring when she was given an interpretation of the settings of the attacks. The analysis was begun in the fall. Since that spring, now a year ago, she has had only two very mild urticarial manifestations.

Theoretical

The fact that this patient's urticaria should have occurred consistently and exclusively when her longings were in a particular state of frustration, cannot be without significance. But this finding alone is far from a solution of the problem. In the first place, this is only one analyzed case, to which a second has now been added. Despite confirmatory material from cases seen in interview, it may be that detailed analytic study of others will reveal some other emotional situation. In the second place, there remains the important question of why just an urticarial swelling of the skin should be the choice of symptom for the manifestation of this particular emotional tension. Why a wish to be fed should affect the stomach is readily intelligible, but why should frustrated longing result in urticaria? One possibility that suggests itself for the choice of the skin as the site of the lesion, is the status of the exhibitionism. This was a prominent feature in this case, and even more prominent in the second analyzed case, and has been remarked by Lorand (*14*) and other authors. It has been particularly noted in the literature in regard to skin disorders with important psychogenic elements. Miss Q., the patient here reported, so repressed her strong exhibitionism that, although she yearned to shine as a dancer, actress, be admired for her conversation, and so on, and these exhibitionistic tendencies appeared clearly in her dreams, yet she was unable to disrobe herself even partially when with even her most intimate girl friends. However, while exhibitionism was prominent in the emotional settings of her few episodes of erythema and itching as has been reported above, it was by no means a prominent or constant feature in the settings of the attacks of urticaria.

Another suggestion as to the choice of the skin is one which has been made widely in the literature, particularly the psychoanalytic literature. This is a heightened erotism of the skin. In terms of the libido theory, this would then follow the well known mechanism by which, when longings are aroused but cannot be satisfied through genital sexual activity, the frustrated excitement (whether mediated chemically, nervously, or both) affects the skin. This mechanism appeared explicitly in a young woman who developed a generalized urticaria during her analysis. Her central problem was sexual inhibition. She was chronically frustrated in her intense sexual wishes because of guilt, and came to analysis for relief of this inhibition. Her urticaria developed upon awakening from a dream that she was about to relieve her sexual feelings by masturbation when her uncle arrived, and so she did not. Here the last minute frustration is of desires that are frankly sexual. In the light of the preceding observations it is unlikely that the occurrence of the urticaria at this point was entirely coincidental. Here, as in the case of Miss Q., the genital sexual activity is blocked by the too strong masochism. That masochism may play a rôle in skin symptoms has been pointed out by Rado (*8*). The masochism in this case was certainly far more severe than in the average. These considerations would still leave unanswered questions as to whether the heightened erotism of the skin is primary or secondary,[10] and as to what the relationships are between the longings and the skin. Two possible relationships are suggested by the data. The one is through skin erotism, that is, a desire to satisfy these wishes through the skin as an organ, by its being seen or touched; the other is through the concomitant endocrinological changes.

If we are to think biologically, we must not forget the importance of the skin in human sexuality. Our mechanistic training interferes with biological functional thinking and observation. But evidence to date, from the literature and from my own limited experience, indicates that the relationship of the skin to sexuality is an important clue to the etiology of urticarias of this particular type.

As to the second possibility, endocrinological dysfunction has been seriously considered as a cause of urticaria and certain urticarias are regarded as directly related to the menstrual cycle, to the menopause, and to pregnancy (*25*). The occurrence in this case of urticaria at points of sharp fall in hormone level confirms this connection. Certainly much light will be shed upon this type of urticaria as well as upon the relation of the skin to sexual tension, by further knowledge of the endocrines and their chemistry in relation to sexuality.

From this and other cases, sexuality appears to be an important link in the causal chain, but just how is not entirely clear. While genital sexuality exists as an emotional impulse and mechanism, the essential point (at least in the human psychology) is that this mechanism acts as a channel for desires and impulses of various types. According to this concept, the patient with her strong need for love would attempt to gratify this need through the channel of the genital sexual relationship to a man, but would be unable to do so because of her fears of utilizing this channel and would, therefore, be left with intense cravings for love which she

[10] Perhaps Miss Q's skin erotism was heightened by the father, through his sexually colored punishments, and possibly through other treatment which does not appear in the history. Dr. Maxwell Gitelson has told me that a woman patient of his, with a heightened skin erotism, had been massaged with alcohol by her father throughout childhood. When sexual feelings entered the transference, she developed urticaria.

could not satisfy through heterosexual activity. Hence these cravings for love would remain permanently unsatisfied and additional frustration would result in urticaria, regardless of whether this frustration was a disappointment in general desires for love, for example, when Miss A. came to town and did not pay the patient enough attention; or whether these were more specific wishes for the sexual love of a man, which would be one way of satisfying the general longings. The basic thing would remain the frustrated need for love.

To formulate the explanation slightly differently, this girl is an infantile personality, with an infantile uterus and abnormally low sexual hormone level in her menstrual cycle. The content of her libidinal longings is also infantile, in fact so much so that from it these physiological conditions were predicted. The essence of this content is to have the love of a good and strong father and in the deepest layer, of a good mother. Because of the patient's guilt the wish for the strong father is also for a punishing father, as in the dreams of being attacked by a thinly disguised representative of the father. This infantile wish for the father is more or less sexualized. One way the patient seeks to satisfy it is by sexuality, but this is *blocked internally because of the masochistic component* (the wish to be punished) *and so the frustration results.*

Schematically and very tentatively, the situation would be something like this: Longings for love (intensified by early deprivations, present frustrations and overexertion)→wishes to satisfy these through sexual love (with strong components of being admired, accepted and perhaps with a special relationship to satisfaction through the skin)→frustration of these desires due to fears of sex→when the longings are sufficiently aroused and frustrated, the urticaria develops.

Urticaria, in this case, did not affect the skin exclusively (*25*). This patient also had edematous swellings of her throat and it is not unlikely that her sinusitis was related to a swelling of the mucosa. It is well known that internal organs may also be affected. This leads us, however, into a consideration of the physiology of the vasodilatation and away from the main point of the paper, which is concerned with the psychological settings rather than the physiological mechanisms of mediation.

Although this report deals with only a single case (confirmed by others), it is worth while to compare the findings with those of the extensive asthma study of the Chicago Institute for Psychoanalysis (*8*). In brief, conflictful libidinal wishes and the theme of separation are central in both conditions. But in the urticaria, the wishes for love are less regressive than in asthma, more manifest and consciously accepted, more sexualized, and in this case, more directed toward the father, although longings for the mother are clearly evident in the background. The dynamic situation in urticaria is that these longings are in the moment of frustration. On the other hand, in asthma, the wishes are more regressive as seen in the prominence of dreams and fantasies of returning to the protecting womb ("proto-receptive" as Alexander has called them). These wishes are usually feared and repressed. Also the asthma seems to be a more acute symptom than the urticaria, more of an emergency measure, which is invoked when separation from the mother or loss of her love is suddenly threatened. The asthma attack often seems to replace a repressed cry of the vocal, and in early days, tearless sort. This may be a determinant of the choice of organ. The urticaria on the other hand seems in this case to take the place of weeping (repressed weeping, as it were), or at least to be re-

lated to it. Confession was important in this case of urticaria, as it is in asthma, and this patient's overcompensatory helping, giving attitude was frequent in the asthma series also.

In this case of urticaria in the second analyzed case and in those seen in interviews, and also in the asthma cases, the symptoms were connected with strong longings for love. Such longings were also found to be directly connected with pruritis ani in three cases, and pruritis ani is thought to be an allergic symptom in certain cases. Frustrated longings have also been found to play a rôle in certain cases of colds (*19*); and some authors distinguish a group of colds as basically allergic (*13*). The patient herein reported had flare-ups of sinusitis, which the allergist considered to be secondary to swelling of the mucosae on an allergic basis. The fact that libidinal longings should be found to be directly connected with these different types of allergic symptoms suggests a connection between states of unsatisfied longing and certain states of allergic sensitivity (*10*). Possibly the states of longing increase the allergic sensitivity.[11]

The need in every case for a complete medical work-up before analysis is obvious. Amebic dysentery, blood dyscrasias, local skin disease, insect bites, serum sickness, and active focal or general infections must be ruled out. Pathological disturbances may be perceived in dreams before they are perceived in waking life (*9*). It is possible, therefore, that allergic responses might influence dreams, as does thirst, urges to urinate, sexual tension, and so on. It is frequently observed that children during the summer preceding their first hayfever year are restless, irritable, and averse to eating. They lose weight and occasionally become unsociable, but with the onset of frank and overt symptomatology they are apt to become quite themselves again. Of similar interest are two milk-sensitive patients who had distressing nightmares whenever raw milk was ingested. However, few workers in the field report more than a 10 per cent incidence of positive skin tests in this type of chronic urticaria. Furthermore, whatever may be the specific agent, the analysis seems definitely to reduce the number and severity of the attacks without the removal, as far as we are able to ascertain, of any extrinsic factors.

It is, I hope, needless to state that nothing in this discussion is meant to imply that all allergic symptoms are psychogenic, or that the emotional state is of any importance in certain cases. Moreover, the converse question of the possible effects upon the psychological state of allergic responses has not been considered. This paper has focused exclusively upon the emotional factor in cases selected because of the prominence of this factor. It may be, of course, that all allergic individuals show, in varying degrees, a common peculiarity in their personalities as some authors believe. If so, it may be that this peculiarity is largely a reflection of an underlying, unsatisfied longing in a certain status, or of reactions to it. But thus far, only a beginning has been made toward the answer of this fundamental question.

[11] That emotional states may affect allergic sensitivity is not a new suggestion. Stokes and Beerman (*24*) conclude from their review of the literature "that there is a slow accumulation of evidence for the belief that in the allergic seizures . . . particularly in urticarias and eczema, psychogenic factors . . . are capable of modifying materially the so-called allergic reactivity of the skin." From the material it appears that the more specific emotional state involved is one of libidinal longing.

Summary

A young woman with intense longings for love was unable to satisfy these desires by a normal sexual relationship with a man because of her fears and inhibitions. She developed urticaria at

TABULAR SUMMARY

First Major Attack

Date	*Life Situation or Content of Associations*	*Dream*	*Urticaria Attack*
End of Oct.	Engagement of Miss N., girl in whose family patient was living. Patient leaves the family to room alone. Father married girl age of patient's sister and leaves.		
End of Nov.	Miss A., girl at office upon whom patient is dependent, decides to leave to be with her father. Patient decides to break with her boy friend. These were patient's last contacts in town.		First hives occur at just this point. Few mostly on forehead.
Dec. 17	Overworking at office, managing Christmas party, fight with fiance, Miss A. leaving to be with her father.		That evening severe generalized urticaria, which persisted.
May 24	Accepted for psychoanalysis		Urticaria clears up.
	Attacks Observed During Analysis		
1) Oct. 5	First analytic session. Told that all analyses begin with trial period. Fears that after trial period patient will not be accepted for analysis, but will be sent away.		Upset for three hours after the session, with urticarial swelling, chiefly of face, lasting until next day.
2) Oct. 12	Fears that because of what patient will tell in the analysis she will be sent away.	(Night of Oct. 11–12) *Father came to my office to say goodbye.*	Awoke in morning of Oct. 12 with urticarial swelling of upper lip.
3) Oct. 25–28	Beginning of menstrual period. Disappointment that fiance cannot find job and marry, with unconscious implication that patient would prefer marrying psychoanalyst.		Severe, generalized urticaria—Oct. 25–28. Wept on afternoon of Oct. 28, urticaria diminished and disappeared the next day.
4)	For several days, up to Nov. 19, unsatisfied cravings for love—unconsciously implying the wish that psychoanalyst satisfy them.	Repetitive dream each night with: "*Some object or person that I set my heart on slipped away out of my grasp.*"	Patient awoke from the dreams weeping profusely. At end of analytic sessions, no weeping but urticaria, especially of eyes and lips.
5) Jan. 7	Feelings of frustration and plea for more direct help by psychoanalyst.	Night of Jan. 6. "Another girl's work was in a basket with mine. I could not tell which was which. I said I would help the girl, who was crying, but I was so nervous that *though I was trying, I was of no real help to her.*" Associations deal with the patient's identification with this girl, who was terribly lonely because of losing her mother, father, and fiance.	Patient awakes from this dream with urticaria.
6) Jan. 18	Anger (for not satisfying patient's wishes) at analyst, but fears that if she expresses it she will be sent away.	Night of Jan. 17. Three dreams, the last being patient's repetitive dream, of "*something or someone I yearn for slipping through my grasp.*"	Patient awakes from the last dream, not with weeping as on previous occasions (see attack Nov. 4, Nov. 19), but with urticaria.

TABULAR SUMMARY—Continued

Date	*Life Situation or Content of Associations*	*Dream*	*Urticaria Attack*
		Attacks Observed During Analysis—Continued	
7) Jan. 19	Fears of losing her job due to reorganization of the office.	Night of Jan. 18. "I was invited by Miss A. to go with her on a visit to her father in another city. *I was anxious to go* and accepted, but at the station I remembered that I had an engagement with an elderly woman, and *at the very last minute did not go*, and the girl was angry."	Awakes with a few widely distributed hives.
8) Nov. 3	On Nov. 2, fiance had prospect of good position (which would have made marriage possible) but at the last minute failed to get it. Analytic hour cancelled by analyst. (Height of hormone level in menstrual cycle.)	No dream reported.	Urticaria; all afternoon of Nov. 2, patient disappointed, desire to weep which she struggles against. That night she develops urticaria on chest and right thigh.
9) Nov. 9	Fear to tell analyst of her sex play in childhood, and unconsciously of her sexual wishes toward the analyst.	Night of Nov. 8. "I was married to a man who looked like father. He slit my throat so I couldn't tell something and threw me downstairs from the attic *to get rid of me*. Then *he ran away from me* as I tried to yell, although dead I would haunt him."	Awakens with urticarial swelling of throat.
10) May 23	After days of anticipation, Miss A. comes to town but pays little attention to patient. Patient terribly disappointed. (Height of hormone level in menstrual cycle.)	No dream reported.	That night, upon retiring, wept, and also urticaria of eyes and lips.
11) Oct. 29	On Oct. 28, fiance gets very poor position. To marry him means a life of poverty, that patient must continue working and must give up her dreams and expectations.	Night of Oct. 28. "I was to marry a young blond fellow, but in the end *had to give him up* and was to marry my fiance."	Urticaria occurs in the early evening of Oct. 28, just after fiance tells patient of getting the position. The dream was that night.
12) Jan. 17	Disappointment in the approaching marriage, which means frustration of patient's dreams of how it would be.	Night of Jan. 16. "My fiance's mother brought me a wool suit in which to be married. I refused it. I had decided to give up having the white bridal costume I had dreamed of *and went to the store for the blue dress* I had decided on. *But they did not have it and I was terribly disappointed.*"	Urticaria.

times when her longings were especially stimulated and frustrated. Twelve attacks were observed during analysis and their emotional settings are described. Eight of them occurred in connection with dreams. These dreams invariably ended on the verge of frustration in an "almost but not quite" situation. Other types of dreams out of a total of 94 were never followed by urticaria and vice versa, with the exception of a repetitive dream of reaching for an object or person who slipped from the patient's grasp. This dream was fol-

lowed by weeping, when not by urticaria. The urticaria appeared when weeping was repressed and often terminated when the patient wept. Some of the observations are somewhat suggestive concerning the choice of sites for the urticaria. The findings were confirmed by a second analyzed case and by a few observations on five cases seen in interview. In connection with other observations, particularly on asthma, they led to the supposition of a possible relationship between certain states of allergic sensitivity and states of intense frustrated longing.

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THE RELATION OF THE RORSCHACH COLOR RESPONSE TO THE USE OF COLOR IN DRAWINGS

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THE RORSCHACH TEST consists of a series of ten ink-blot cards, five of which have areas of different colors. These cards are presented to the subject and the responses obtained are scored. One of the criteria for evaluating the subject tested depends upon the individual's reaction to color. Previous investigation has shown that the original assumption of Rorschach that there is a correlation between color responses and the emotional status of the individual may be correct (*1*, *11*). If this assumption is correct, one would expect to find a relationship between certain aspects of the personality and the use of colors as shown in other types of productions. The first step in this study was an attempt to investigate the relationship between the color responses in the Rorschach test and the use of colors as seen in the drawings of the same subject. This paper presents a method for the scoring of colored drawings and a correlation between the data obtained from the score of the Rorschach color responses and the scoring of the drawings.

LITERATURE

The literature on the Rorschach test is considerable and consists of detailed studies and reviews, the most recent review being that of Hertz (*5*). It is of note that the color problem in the Rorschach test has never been gone into in great detail in spite of the fact that most authors make use of a routine interpretation of color responses. The interpretation of drawings has been widely used in psychiatry for various purposes. Summaries of various attempts at using drawings are presented by Prinzhorn (*10*), Lewis (*1*) Goodenough (*4*) and Schube and Cowell (*12*). The formal aspect of the color problem has been investigated by Pfister (*9*), who attempted to correlate the formal aspects of colored drawings with personality characteristics. Patients were asked to draw objects, the names of which were written on a sheet of paper. In studying the drawings, the criteria which Pfister believed most helpful were concerned with the different colors used as an outline for delineating the form of the object, and the use of color covering areas (plane). Pfister pointed out that the drawings of psychopathic personalities and of primitive and emotionally labile personalities seemed to correlate with the lack of color gradation. He mentioned that developed personalities used more green, and that aggressive personalities made greater use of yellow.

SUBJECTS

For the purpose of this study, 60 individuals, 55 patients, and 5 normal control subjects were selected. The patients consisted of 32 males and 23 females of varied diagnostic groups. Thirty-four of these patients were

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treated on the psychiatric wards and in the psychiatric out-patient department of the Massachusetts General Hospital, and 21 were at the Fernald State School.[1] The age of the subjects ranged from 14 to 46; the mean age for the males was 25, and for the females, 27. The largest single group consisted of 20 feeble-minded patients, selected because of the fact that feeble-minded individuals are known to prefer brilliant and striking colors (*1*). The feeble-minded group was associated with various etiologies such as endocrine disturbances, trauma and lues. There was considerable variation in the I.Q. of this group, the lowest being 55. The psychoneurotic group was represented by 4 hysterics, 1 anxiety neurosis, and 5 obsessive-compulsive neuroses, and one reactive depression. There were 4 schizophrenic patients, 2 manic-depressive patients, 1 patient with alcoholism, and 6 psychopathic personalities. For a still broader distribution of the case material, another group consisting of 7 neurological cases, and 2 patients with atopic dermatitis were used. It was necessary for the patient to cooperate in carrying out the test, hence, idiots, extremely demented patients, and patients with catatonic and other stuporous conditions were excluded.

Procedure

Rorschach test

The cards were presented to the subjects in the usual way. The subject was interrupted when more than six answers were given. This was done because it has been shown that the most characteristic responses (color, movement, gray) are given at the beginning of each card, whereas the later responses are repetitious. The main responses are scored and the additional responses are regarded as an elaboration of the main ones (Rorschach). Following Klopfer (*6*) to some extent, the movement-response in human beings was scored (*M*) and distinguished from the movement answer in animals (MF) as a movement with a form component. As a third movement answer, the passive movement in inanimate objects and landscapes was scored (*FM*) as a form answer with some movement. This is often seen in responses like explosions, magic relations of forces or something being moved to the midline. In establishing the experience balance the movement sum ($M=1$, $MF=0.5$, $FM=0.25$) was compared with the usual color sum $C=1.5$, $CF=1$, $FC=0.5$, $CY=0.5$. *CY* or the color gray responses in answers like clouds, smoke, snow, where the gray was seen as a color, were scored according to Binder (*2*) in the color sum. The symbol, *FY*, as a form response with adaptation to gray and shading, was used in the interpretation of answers "like X-ray pictures." The symbol *YF* was used in cases where patients expressed personal feelings of anxiety, "like huge, bloody-looking gorillas, ready to jump" (Card 4), or where the texture of the material was expressed "like in silk."

The drawings

In order to avoid suggestions as to choice of color, in associations like meadow—green, or sky—blue, the subjects were not requested to draw any object or scene. Instead, pure feelings were suggested and the subject himself had to select the appropriate form and color to express these feelings. As a rule the subjects were asked to sketch two drawings. The first one was in response to a suggestion of sadness in which the patient used an ordinary pencil (Series S). The second drawing which was exe-

[1] We greatly appreciated the opportunity to investigate these patients and thank Dr. Paul Yakovlev and Miss Catherine E. Chipman of the Fernald State School, Waltham, Massachusetts, for their cooperation.

cuted in colors was in response to a suggestion of joy (Series J). In order to obtain more information, some subjects were requested to paint (using water colors) or to draw freely anything that they happened to wish (Series F). The investigator was always present when drawings of Series S and J were made and the subject was left alone for Series F. Sometimes the subjects had to be encouraged. This was noted especially in educated people, whereas, the feeble-minded group showed no hesitation. None of the subjects refused to draw.

The actual procedure was as follows: after the completion of the Rorschach test, the patient was seated at a table and received a sheet of typewriting paper of the size 21×28 cm., and a pencil (Dixon Secretary #758, no. 2) and a writing pad. He was told: "Please try to express feelings of being sad, sorrowful, cheerless, depressed, mournful, or dull, in a drawing. Limit the time to 10 minutes." After having finished the drawing, or after 10 minutes, the patient's explanations of his drawings were recorded. Then the subject received a second sheet of paper, and a box with 15 different colored wax crayons, containing black and white. The subject was told: "Please express your feelings of being joyful, glad, happy, gay, delighted or merry by another drawing using colored pencils."

THE SCORING OF THE DRAWINGS

Inspection of all the drawings showed that two gross classifications were possible. One group was characterized by the presence of considerable color, and the other showed little use of color. Some of the drawings occupied the whole sheet of paper, whereas, in other drawings, only a small area was used. From these considerations the following method of scoring the drawings was developed. This was done in order to have a numerical scale for direct comparison with the Rorschach scores. The criteria which were eventually arrived at are listed below:

1. Size of Drawings: Two coordinates were constructed parallel to the cut edges (axis) of the paper. Since the sheets of paper were rectangular, these coordinates were always at right angles. The vertical coordinate was constructed in such a way that it touched the outermost point of the drawing. The horizontal coordinate was likewise constructed. These two coordinates gave the length and breadth of a framed area, which could be measured in centimeters. The product of these two factors resulted in the measurement of the framed area expressed in centimeters.[2]

2. Color Score of the Drawings: A five-point scale was used for simplicity. One point was assigned for the presence of each of the following criteria:

A. The presence of three or more colors not excluding black.

B. The use of any color (including black) as a plane. (A plane was defined as a color area of 1 cm. or more.)

C. The presence of three or more colors (including black) as a plane.

D. The presence of large planes. A large plane was defined as a surface covered with a single color, the area of which was 60 cm.^{2} or more, which was 1/10 the area of the sheet of paper.

This five-point scale was suggested by the observation that individuals who make liberal use of color tend to cover the spaces between the outlines of drawings with color. On the other hand, subjects who use little color usually make use of it only as a contour similar to the outline of a pencil figure. The intensity of the color used could not be measured. By means of this scale comparable values could be obtained for drawings of all three series.

DATA

ILLUSTRATIVE CASES

The analysis of the Rorschach protocols and of the drawings of two patients are presented below to illustrate the method of evaluating the data.

Patient No. 1—A. H., a 34-year old white, native, born, divorced housewife was admitted to the hospital for the third time complaining of blindness. During the past four years she had complained of fainting spells, vomiting, sharp pains in the back, loss of bladder sensation, and transient paralysis of her legs. Her uterus, appendix and one ovary had been removed during three previous operations. During her most recent admission she developed a complete paralysis of both legs and further episodes of transient blindness and coma. Physical examination showed weakness of left thigh and leg. There was a diminution of sensation over an area of the left thigh, which did not correspond to any known central nervous system lesion. Laboratory examinations including electrocardiogram, electroencephalogram, and X-rays of the skull were within normal limits. The test was made one day after the recovery of her sight.

Diagnosis: Hysteria.

RORSCHACH PROTOCOL

I.	
A bear.	WF+AP
A spine, bones on each side. The white on each side makes it look like a vertebra.	DSF+Anat.
II.	
Looks like something like fire (all red spots).	DC+Fire
Dancing figures, clownish looking.	WM+H
They have red hats.	DCF+Diff.
Red chimney and a black house.	DCF−Arch., Org.
III.	
People in convulsions.	WM+H
Blood.	DC+Blood
Two eyes, laughing mouth and devil's horn. (Center bottom using space.)	DSFC—Fig., Org.
IV.	
A huge gorilla stands on his front paws.	WF+A
A post and people bound against it, leaning on each side (upper center).	DM+H, Org.
V.	
Butterfly.	WF+AP
Like a dancer, dressed as a butterfly.	WF+H
A worm.	WF−A
VI.	
Like a cat's head. Here his face (points to the center) but without the upper part.	DF−Ad
A flower.	WF+Pl.
VII.	
A map.	WF+Geogr.
A woman's, or two women facing each other.	WF+Hd
VIII.	
Flowers (reversed card, center top).	DC+Pl.
Fire (center bottom, card normal)	DC+Fire
Worst devil's face (vague impression of upper part of card).	DF−Fig.
IX.	
Vegetables (green).	DCF−Pl.
Two serpents (outline of the orange, top).	DFC−A
X.	
All faces, eyes and a German helmet (German helmet, gray top, face, space center, eyes, space at top of red).	DSF+Fig. O +Org.
A red cape.	DFC−Diff.

Scoring

R=25

W:10	F:10	H:4	F+%:73
D:15	M: 3	Hd:1	A%:34
S: 3	C: 4	A:5	Org.: 4
	CF: 3	Ad:1	P: 2
	FC: 5	Fire:2	O+: 1
		Blood: 1	Time:32′
		Figure:3	Experience balance=3:11.5
		Arch.:1	Color sum=11.5
		Anat.:1	No. of color responses:12
		Geogr.:1	
		Diff.:2	
		Pl.:3	

SCORING OF DRAWING OF PATIENT I

Fig. 1: Drawing to the suggestion of sadness (Series S). The explanation of

FIG. 1. Pencil drawing of subject No. 1, to the suggestion of sadness (Series S). The size of the paper is 21.5×28 cm. The size of the drawing is 11×9 cm. Title: A Mourning Family.

the patient was: "It will look like a child's drawing. The lines will not join. It should be a mourning family." Measurement $11 \times 9 = 99$ cm.^{2}

Fig. 2: Drawing to the suggestion of joy (Series J). A title: "A country dance." The color scoring: all four criteria were present. Score = 4 points. Measurement: $18 \times 28 = 504$ cm.^{2}

FIG. 2. Colored drawing of subject No. 1, to the suggestion of joy (Series J). Wax crayons were used. The sky is blue, the trees are green with brown trunks. The girl's dress is red, and her head, arms and legs are yellow-brown. The head of the boy is yellow-brown. His suit is black. The size of the paper is 21.5×28 cm. The size of the drawing is 18×28 cm. Title: Country Dance. Color score is 4.

Fig. 3 represents a color drawing, done without any suggestion or time limit (Series F). Explanation of the patient: "Finis. A dying man in the desert. The sun is so wonderful, but burns him. A wolf comes and birds. You will look so, when you die" (points to skeleton). Color score = 4.

The whole sheet is used. (607 cm.^{2}) The drawing (Fig. 3) refers to some actual conflict and to the hysterical paralysis of the patient. This patient represents the best example of the group using color freely with the highest color score in drawings and the highest color sum in the Rorschach protocol. A much greater area is used in the color drawings than in black (pencil) drawings.

Patient No. 21—A 30-year-old, white, married Italian male complained that something was blocking the back of his head. The complaint came on after an accidental fall 7 years ago. For the past 3 years he has geen subject to episodes of depression lasting 3–4 days. More recently he had fainting spells, headache and has been feeling tired. He has also had asthmatic attacks. Physical examination and laboratory studies were within normal limits.

FIG. 3. Colored drawing of subject No. 1 (Series F). No suggestion was made and there was no limit as to time. The sun is red, the title of the drawing, the birds and bodies are black. The ground is yellow-brown and the wolf is brown. The size of the paper is 21.5×28 cm. The size of the drawing is 21.5×28 cm. Title: Finis. Color score is 4.

Diagnosis: Hypochondriasis
Reactive depression
Bronchial asthma.

RORSCHACH PROTOCOL

I.

Looks like the pelvis of a human body.	WF+Anat.

II.

This is the same, beside different color.	WF−Anat.

III.

A mass of red and black ink.	Color naming
It reminds me of the ovaries (points to the head of the man usually seen) here the fimbriae (trunk of man) down here the vagina (bottom center).	DF−Anat., Org.

IV.

I cannot imagine anything.	Rejection

V.	
A bat.	WF+AP
VI.	
A piece of fur.	WFY+AP
VII.	
A mass of nothing in particular.	Rejection
VIII.	
A dog, stepping from a stone to another.	DMF+AP
Segments of a spinal cord (center blue).	DF+Anat.
IX.	
Two lungs (red) here the liver (green) here the fascia, that is a tissue that holds the bowels together (midline, reversed card).	WFC+Anat.,Org.
X.	
A potato root (usually spider, blue).	DF+Pl.
Sweet potato (brown).	DF+Pl.
Vocal cords and esophagus (gray center, bottom, reversed card).	DF+Anat.

Scoring

R=11

W:4	F:8	A:2	P: 2
D:7	MF:1	Anat.:6	Organization: 2
	FY:1	Pl.:2	F+%:75
	FC:1	Diff.:1	A%:27

Experience balance 0.5:0.5
Color sum:0.5
Card rejection:4 and 7
Color responses:1

SCORING OF THE DRAWING

Fig. 4 represents the drawing made to the suggestion of sadness (Series S). The drawing was completed in two minutes. "Somebody who cries." Measurement: $18 \times 15 = 270$ cm.^{2}

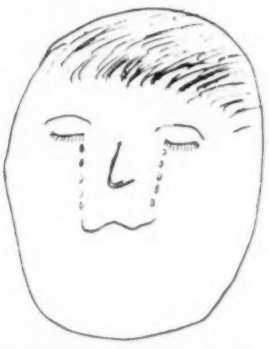

Fig. 4. Pencil drawing of subject No. 12, to the suggestion of sadness (Series S). The size of the paper is 21.5×28 cm. The size of the drawing is 18×15 cm. Title: "Somebody, who cries."

Fig. 5 represents the drawing to the suggestion of joy (Series J). The drawing was completed in three minutes. "Somebody who laughs."

Fig. 5. Colored drawing of subject No. 12, to the suggestion of joy (Series J). The hair, eyes, mouth and nose are black. The outline and the ear were first done in yellow and covered with red. The size of the paper is 12.5×28 cm. The size of the drawing is 14×23 cm. Title: "Somebody, who laughs." Color score is 1.

Color scoring gives 1 point for presence of black in a plane (hair) = score 1. Measurement $14 \times 23 = 322$ cm.^{2}

Fig. 6 represents a color drawing without any suggestion or time limit (Series F). "The crucifixion of Christ. That comes to my mind when I think of religion."

Fig. 6. Colored drawing of subject No. 12 (Series F). No suggestion was made and there was no time limit. The size of the paper is 21.5×28 cm. The size of the drawing is 11×15 cm. Title: Crucifixion of Christ. Color score is 0.

Measurement of area is $15 \times 11 = 165$ cm.^{2}

Color scoring shows that none of the criteria are present. Score = 0. Mean

colorscore for J and $F=0.5$. Mean color-measurement = 244 cm.^{2}

This patient is an example of the other extreme of a low color score in the Rorschach test and in the drawings. The area used was not greater in the color drawings than in the pencil drawing.

The drawings of patient no. 27 are presented in Figs. 7 and 8. Fig. 7 is another example of a low color score.

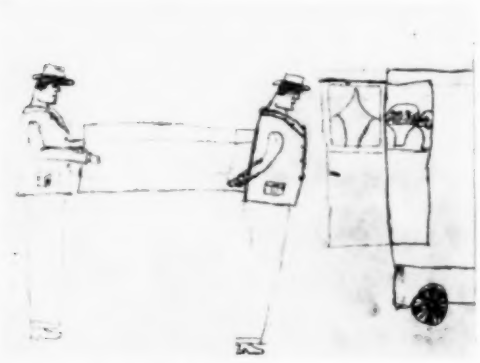

FIG. 7. Pencil drawing of subject No. 27, to the suggestion of sadness (Series S). The size of the paper is 21.5×28 cm. The size of the drawing is 18×27 cm. Title: "Funeral."

FIG. 8. Color drawing of subject No. 27, to the suggestion of joy (Series J). The chimney of the house is outlined in orange. No other colors were used except black. The size of the paper is 21.5×28 cm. The size of the drawing is 16×23 cm. Title: "Turkey dinner on Thanksgiving." Color score is 1.

SUMMARY OF DATA

The data for the individual cases are presented in Tables A and B. Table A includes the general data for the individuals and their clinical diagnoses. The values for the area used in the three series of drawings are listed in columns 4, 5 and 6. The color score for drawings of Series J and Series S are presented in columns 7 and 8. Columns 9 and 10 include the data on the number of color responses and the color sum as obtained from the Rorschach test. The number of responses was obtained by counting all the color responses without discriminating as to whether the score was *C*, *CF*, *FC* or *CY*. The color sum (column 10) was obtained in the usual way of scoring the Rorschach ($C=1.5$, $CF=1$, $FC=0.5$, and $CY=0.5$). The corrected color score is not presented. Table B presents the data obtained on scoring the protocols of the Rorschach test for all of the subjects.

The analysis and correlations obtained from Tables A and B are presented below.

A. SUMMARY OF DATA OF DRAWINGS

Consistency of the area used and of the color score of the drawings: In an attempt to obtain data on the consistency of the areas used and of the color score of the drawings, a series of subjects were asked to make more than one drawing. For comparison one drawing of Series J, in which the mood was suggested and the time of execution limited, is compared with one or more drawings of Series F (no suggestion was made as to topic, and the time allowed was unlimited). From Fig. 9 it can be seen that subjects 1 and 60 have high values for the area used in both series (mean value 571 cm.^{2} and 497 cm.^{2}) and high color score values (3.7 and 3.5). Subject 15 has low values for the area used (mean 172 cm.^{2}) and also a lower mean value (2.8) for the color score in the drawings presented. There seems to be some variability for the area, the

TABLE A

ANALYSIS OF THE DRAWINGS AND RORSCHACH TESTS WITH RELATED DATA ON SIXTY SUBJECTS

No. of Subject	Age	Sex	Drawings: Areas of different series			Color Score		Rorschach Test		Diagnosis
			Area of black drawings Series S	Area of color drawings Series J	Area of free drawings Series F	Series J	Series F	No. of color responses exclusive of *CY*	Color sum	
1	36	F	99	504	607	4	4	12	11.5	Hysteria
2	30	F	54	252	—	3	—	5	5.5	Hysteria
3	42	F	189	170	—	1	—	5	5	Hysteria
4	29	F	44	40	—	1	—	2	1	Hysteria
5	18	F	187	255	364	4	3	7	6	Compulsive neurosis
6	19	M	588	384	—	1	—	1	0.5	Compulsive neurosis
7	27	M	280	260	—	2	—	2	1	Obsessionive neurosis
8	33	F	187	242	—	3	—	2	1.0	Mixed psychoneurosis
9	21	M	63	285	459	1	1	—	—	Obsessional neurosis
10	18	F	120	168	84	2	3	4	4.5	Obsessional neurosis
11	32	M	450	238	—	0	—	1	0.5	Anxiety neurosis
12	30	M	270	322	165	1	0	1	0.5	Reactive depression
13	18	F	20	457	—	1	—	5	5.5	Atopic dermatitis
14	24	F	36	276	—	3	—	3	2.5	Atopic dermatitis
15	18	F	368	160	294	2	4	3	3.5	Manic depressive
16	18	F	120	192	—	2	—	2	1.5	Manic depressive
17	41	F	85	21	—	0	—	1	0.5	Schizophrenia
18	26	M	110	286	—	0	—	3	1.5	Schizophrenia
19	33	M	187	221	—	0	—	0	0	Schizophrenia
20	25	F	6	247	—	0	—	1	0.5	Schizophrenia
21	24	M	63	204	—	2	—	3	3	Psychopathic personality
22	19	F	325	285	—	3	—	5	3.0	Psychopathic personality
23	22	M	160	282	—	4	—	2	3	Psychopathic personality
24	23	F	21	442	126	4	1	3	3	Psychopathic personality
25	46	M	12	63	—	0	—	0	0.5	Chronic alcoholism
26	27	M	72	234	90	4	3	3	3	Chronic encephalitis
27	13	M	486	368	—	1	—	0	0.5	Pituitary dysfunction
28	18	F	9	607	—	4	—	3	3.5	Amyotrophic lateral sclerosis
29	32	F	96	165	—	1	—	0	0	Myasthenia gravis
30	24	M	250	168	—	3	—	4	4.5	Progressive muscular dystrophy
31	36	F	90	414	—	3	—	5	4.5	Pituitary dysfunction
32	32	F	475	221	600	2	4	3	3	Epilepsy
33	27	F	32	192	—	1	—	4	2	Epilepsy
34	19	M	56	384	—	3	—	4	4.5	Psychopathic personality
35	27	M	187	231	—	1	—	3	4.5	Cretin
36	23	M	150	209	380	4	3	4	6	Moron
37	30	M	208	500	80	3	3	5	3.5	Moron
38	22	M	501	521	361	1	1	3	4	Moron
39	24	M	132	607	607	1	0	1	1.5	Moron
40	21	M	378	434	—	2	—	2	1.5	Psychopathic personality
41	29	M	75	45	—	1	—	4	3.5	Moron
42	21	M	144	36	—	1	—	2	2.5	Moron
43	21	M	27	256	—	1	—	4	5.5	Moron
44	24	M	56	532	—	3	—	1	1	Moron
45	20	M	45	135	—	1	—	1	2.5	Moron
46	21	M	98	120	108	3	1	2	2	Moron
47	24	M	224	171	525	0	2	4	3.5	Moron
48	21	M	222	567	—	0	—	2	1.5	Moron
49	25	M	15	306	525	0	0	2	1.5	Moron
50	23	M	44	108	—	0	—	0	0	Moron
51	26	M	112	156	196	0	0	4	3	Moron
52	20	M	180	70	—	0	—	0	0	Moron
53	23	M	18	128	—	0	—	0	0	Moron
54	30	M	32	252	216	1	1	2	1.0	Moron
55	22	M	40	588	—	4	—	4	4	Moron
56	30	F	441	588	—	3	—	5	5.5	Control subject
57	30	M	234	384	—	2	—	2	2.5	Control subject
58	20	F	588	240	—	2	—	3	1.5	Control subject
59	42	M	238	315	—	2	—	3	1.5	Control subject
60	37	F	54	324	607	4	4	7	8.5	Control subject

TABLE B

SELECTED RESPONSES OF SIXTY SUBJECTS TO THE RORSCHACH TEST SCORED IN THE CONVENTIONAL MANNER

Pat. No.	R	W	D	Dd	M	MF	FM	C	CF	FC	CY	FY	YF	F+%	A+%	EB	Time	Rejection
1	25	10	15	—	3	—	—	4	3	5	—	—	—	73	34	3 / 11.5	32	—
2	24	2	21	1	—	1	—	2	1	2	1	—	—	94	29	0.5 / 5.5	25	—
3	30	6	21	3	2	1	1	2	1	2	—	—	—	63	43	2.5 / 5	24	—
4	14	6	7	1	—	—	—	—	—	2	—	—	—	83	43	0 / 1	22	8
5	29	4	24	—	1	—	—	1	2	4	1	1	—	95	31	1 / 6	32	—
6	21	—	20	1	—	—	—	—	—	1	—	—	—	85	33	0 / 0.5	23	2
7	19	4	15	—	1	—	—	—	—	2	—	1	1	92	57	1 / 1	22	—
8	17	4	13	—	3	2	1	—	—	1	1	—	—	100	47	4 / 1	24	—
9	15	5	10	—	1	2	—	—	—	—	—	—	2	90	55	2 / 0	24	—
10	14	1	12	1	—	—	—	2	—	2	1	—	—	75	35	0 / 4.5	17	5
11	19	3	15	1	1	—	—	—	—	1	—	—	1	60	10	1 / 0.5	18	—
12	11	4	7	—	—	1	—	—	—	1	—	—	—	75	27	0.5 / 0.5	28	4, 7
13	21	8	13	—	1	—	—	2	1	2	1	—	—	88	62	1 / 5.5	25	—
14	34	5	26	3	2	—	—	—	—	3	2	2	1	79	44	2 / 2.5	32	—
15	18	5	13	—	—	—	—	1	1	1	2	—	—	87	44	0 / 3.5	19	—
16	28	8	18	2	1	—	—	—	—	2	—	—	—	88	68	1 / 1.5	29	—
17	16	—	9	7	—	—	—	—	—	1	—	—	—	53	25	0 / 0.5	15	—
18	29	11	18	—	—	—	2	—	—	3	—	1	—	48	51	0 / 1.5	28	—
19	10	3	5	2	—	1	—	—	—	—	—	—	—	66	60	1.5 / 0	18	6, 10
20	18	7	11	—	1	—	1	—	—	—	1	—	—	33	33	1.0 / 0.5	25	—
21	22	9	11	2	2	—	—	1	1	1	—	2	2	80	40	2 / 3	26	—
22	45	3	31	11	—	1	1	—	—	5	1	5	—	50	62	0.5 / 3	48	—
23	20	5	12	3	2	1	1	1	1	—	1	2	2	77	25	2.5 / 3	28	—
24	20	6	11	1	—	—	—	1	1	1	—	1	—	94	25	0 / 3	19	—
25	17	4	12	1	2	1	—	—	—	—	1	—	—	84	58	2.5 / 0.5	20	6
26	12	8	4	—	1	—	—	—	2	1	1	—	—	43	33	1 / 3	16	—
27	26	6	18	2	—	2	—	—	—	—	1	2	—	52	57	1 / 0.5	23	—
28	20	4	14	2	1	1	—	1	2	—	—	—	—	50	45	1.5 / 3.5	27	—
29	10	1	7	2	—	—	—	—	—	—	—	—	—	90	40	0 / 0	35	9, 10
30	14	8	6	—	1	—	—	1	2	1	1	2	—	83	21	1 / 4.5	15	—
31	27	3	22	2	—	—	—	—	2	3	2	2	—	50	40	0 / 4.5	31	—
32	14	5	9	—	—	—	—	—	1	2	2	—	—	66	66	0 / 3	26	—
33	16	4	12	—	1	—	—	—	—	4	—	—	—	81	75	1 / 2	18	—
34	34	4	18	12	—	—	—	—	1	3	4	—	—	15	61	0 / 4.5	35	—
35	24	7	14	3	—	1	2	2	1	—	1	1	—	81	37	0.5 / 4.5	28	—
36	14	4	10	—	—	—	2	4	—	—	—	1	1	33	30	0 / 6	15	—
37	17	6	9	2	—	—	—	1	—	4	—	2	—	40	41	0 / 3.5	12	—
38	18	3	14	1	1	1	—	—	1	2	4	—	—	66	50	1.5 / 4	22	—
39	13	9	4	—	1	—	—	—	1	—	1	—	—	60	54	1 / 1.5	11	—
40	13	10	3	—	1	1	—	—	1	1	—	—	—	55	58	1.5 / 1.5	17	—
41	19	7	12	—	1	—	1	1	1	2	—	1	1	66	57	1.0 / 3.5	20	—
42	12	6	6	—	2	2	—	1	—	1	1	—	—	40	58	3 / 2.5	16	—
43	17	8	7	2	—	1	—	2	2	—	1	—	—	70	47	0.5 / 5.5	20	—
44	17	1	15	1	—	—	—	—	1	—	—	—	—	81	94	0 / 1	18	—
45	22	8	24	1	1	1	1	—	1	—	3	2	—	66	57	1.5 / 2.5	35	—
46	14	4	9	1	4	1	—	1	—	1	1	—	—	66	35	4.5 / 2	19	—
47	23	4	15	4	—	—	—	1	1	2	—	2	—	41	48	0 / 0.5	20	—
48	31	3	27	1	—	—	—	—	1	1	—	—	—	20	9	0 / 1.5	25	—
49	12	7	5	—	1	—	1	—	1	1	—	1	—	58	50	1.0 / 1.5	10	—
50	13	2	11	—	1	1	—	—	—	—	—	1	—	30	70	1.5 / 0	15	—
51	13	5	7	1	—	—	1	—	1	—	4	1	—	50	23	0 / 3	15	—
52	11	4	7	—	—	—	—	—	—	—	—	—	—	90	81	0 / 0	12	—
53	21	9	12	—	1	1	—	—	—	—	—	—	—	73	68	1.5 / 0	25	—
54	33	4	23	7	—	—	—	—	—	2	—	—	—	51	78	0 / 1.5	28	—
55	16	5	11	—	—	—	—	—	4	—	—	—	—	58	50	0 / 4	24	—
56	34	6	29	—	3	2	—	2	2	1	—	—	1	95	50	4 / 5.5	32	—
57	57	8	44	5	4	4	1	—	2	—	1	3	—	80	49	6 / 2.5	45	—
58	21	4	17	—	2	2	—	—	—	3	—	1	1	100	52	3 / 1.5	20	—
59	42	8	33	1	4	—	1	—	—	3	—	—	—	97	33	4 / 1.5	40	—
60	41	8	34	—	—	1	—	2	3	3	2	1	—	93	56	0.5 / 8.5	45	—

color scoring and for the ratio of area and the color score from test to test. A comparison of the values in 19 subjects from whom a drawing of Series J and of Series F was obtained, shows essentially the same values for the

mean area (Series J 303 cm.^{2}, Series F 336 cm.^{2}) and for the mean color score (Series J, 2.16, Series F, 2.0). These data indicate that there is an intra-individual consistency for the area used and for the color score. They also indicate that the mean values for the area used and for the color score were not dependent upon the manner in which the directions for making the drawings were given. It would seem that no change in mean values could be observed whether a suggestion was given (Series J) or not (Series F), and, whether the time was limited (Series J) or unlimited (Series F).

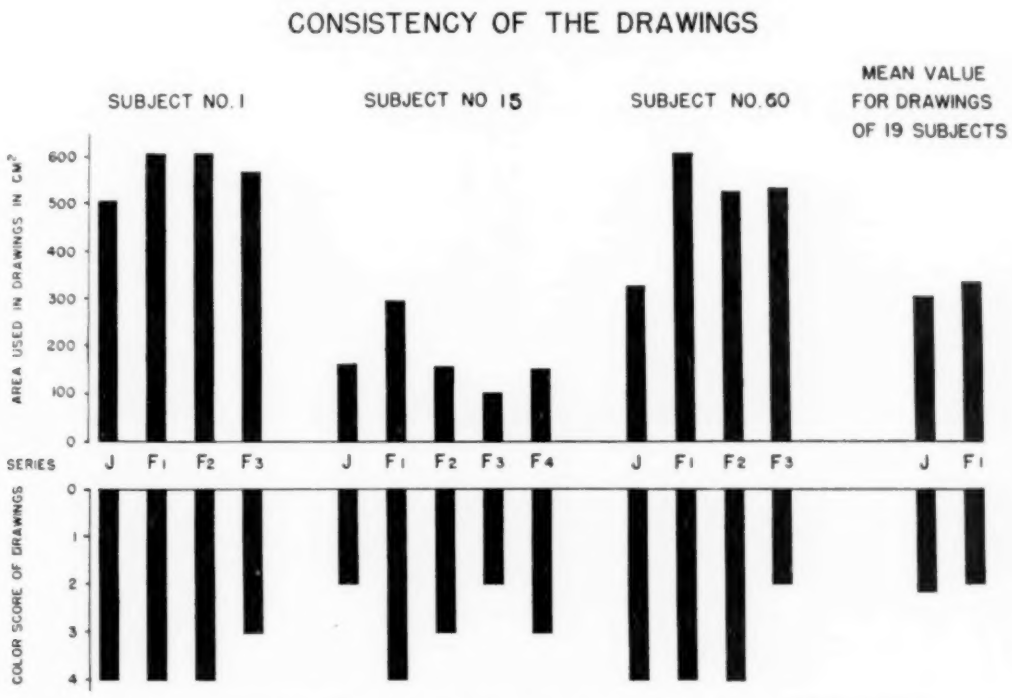

FIG. 9. The consistency of the area and the color score of the drawings of three subjects. Mean values for nineteen subjects for Series J and F are presented at the right of the figure.

A glance at the values for subjects 1, 15 and 60 (Fig. 9) indicates that in these three cases there is a direct relationship between the area used in the color drawings (Series J) and the color score. In other words, drawings occupying the greatest area are associated with high color score values. The data relating to this problem for all of the subjects in this study are presented in Fig. 10. Here it can be seen that the individuals having high color scores use larger areas in the color drawings of Series J. For example the mean value for the areas used in Series J for 11 subjects with a color score of 3 was 342 cm.^{2}, (Black columns, Fig. 10) which is to be contrasted with the mean value of 263 cm.^{2} for 17 subjects having a color score of 1.

In other words, it can be stated that individuals who use more color in their drawings tend to produce larger drawings. It was felt of interest to examine the area used by these subjects in making pencil drawings (Series S). It can readily be seen that individuals with color scores of 0, 1, 3 and 4 use larger areas in the color drawings than they do in the pencil drawings. Subjects

TABLE B

SELECTED RESPONSES OF SIXTY SUBJECTS TO THE RORSCHACH TEST SCORED IN THE CONVENTIONAL MANNER

Pat. No.	R	W	D	Dd	M	MF	FM	C	CF	FC	CY	FY	YF	F+%	A+%	EB	Time	Rejection
1	25	10	15	—	3	—	—	4	3	5	—	—	—	73	34	3 / 11.5	32	—
2	24	2	21	1	—	1	—	2	1	2	1	—	—	94	29	0.5 / 5.5	25	—
3	30	6	21	3	2	1	1	2	1	2	—	—	—	63	43	2.5 / 5	24	—
4	14	6	7	1	—	—	—	—	—	2	—	—	—	83	43	0 / 1	22	8
5	29	4	24	—	1	—	—	1	2	4	1	1	—	95	31	1 / 6	32	—
6	21	—	20	1	—	—	—	—	—	1	—	—	—	85	33	0 / 0.5	23	2
7	19	4	15	—	1	—	—	—	—	2	—	1	1	92	57	1 / 1	22	—
8	17	4	13	—	3	2	1	—	—	1	1	—	—	100	47	4 / 1	24	—
9	15	5	10	—	1	2	—	—	—	—	—	—	2	90	55	2 / 0	24	—
10	14	1	12	1	—	—	—	2	—	2	1	—	—	75	35	0 / 4.5	17	5
11	19	3	15	1	1	—	—	—	—	1	—	—	1	60	10	1 / 0.5	18	—
12	11	4	7	—	—	1	—	—	—	1	—	—	—	75	27	0.5 / 0.5	28	4, 7
13	21	8	13	—	1	—	—	2	1	2	1	—	—	88	62	1 / 5.5	25	—
14	34	5	26	3	2	—	—	—	—	3	2	2	1	79	44	2 / 2.5	32	—
15	18	5	13	—	—	—	—	1	1	1	2	—	—	87	44	0 / 3.5	19	—
16	28	8	18	2	1	—	—	—	—	2	—	—	—	88	68	1 / 1.5	29	—
17	16	—	9	7	—	—	—	—	—	1	—	—	—	53	25	0 / 0.5	15	—
18	29	11	18	—	—	—	2	—	—	3	—	1	—	48	51	0 / 1.5	28	—
19	10	3	5	2	—	1	—	—	—	—	—	—	—	66	60	1.5 / 0	18	6, 10
20	18	7	11	—	1	—	1	—	—	—	1	—	—	33	33	1.0 / 0.5	25	—
21	22	9	11	2	2	—	—	1	1	1	—	2	2	80	40	2 / 3	26	—
22	45	3	31	11	—	1	1	—	—	5	1	5	—	50	62	0.5 / 3	48	—
23	20	5	12	3	2	1	1	1	1	—	1	2	2	77	25	2.5 / 3	28	—
24	20	6	11	1	—	—	—	1	1	1	—	1	—	94	25	0 / 3	19	—
25	17	4	12	1	2	1	—	—	—	—	1	—	—	84	58	2.5 / 0.5	20	6
26	12	8	4	—	1	—	—	—	2	1	1	—	—	43	33	1 / 3	16	—
27	26	6	18	2	—	2	—	—	—	—	1	2	—	52	57	1 / 0.5	23	—
28	20	4	14	2	1	1	—	1	2	—	—	—	—	50	45	1.5 / 3.5	27	—
29	10	1	7	2	—	—	—	—	—	—	—	—	—	90	40	0 / 0	35	9, 10
30	14	8	6	—	1	—	—	1	2	1	1	2	—	83	21	1 / 4.5	15	—
31	27	3	22	2	—	—	—	—	2	3	2	2	—	50	40	0 / 4.5	31	—
32	14	5	9	—	—	—	—	—	1	2	2	—	—	66	66	0 / 3	26	—
33	16	4	12	—	1	—	—	—	—	4	—	—	—	81	75	1 / 2	18	—
34	34	4	18	12	—	—	—	—	1	3	4	—	—	15	61	0 / 4.5	35	—
35	24	7	14	3	—	1	2	2	1	—	1	1	—	81	37	0.5 / 4.5	28	—
36	14	4	10	—	—	—	2	4	—	—	—	1	1	33	30	0 / 6	15	—
37	17	6	9	2	—	—	—	1	—	4	—	2	—	40	41	0 / 3.5	12	—
38	18	3	14	1	1	1	—	—	1	2	4	—	—	66	50	1.5 / 4	22	—
39	13	9	4	—	1	—	—	—	1	—	1	—	—	60	54	1 / 1.5	11	—
40	13	10	3	—	1	1	—	—	1	1	—	—	—	55	58	1.5 / 1.5	17	—
41	19	7	12	—	1	—	1	1	1	2	—	1	1	66	57	1.0 / 3.5	20	—
42	12	6	6	—	2	2	—	1	—	1	1	—	—	40	58	3 / 2.5	16	—
43	17	8	7	2	—	1	—	2	2	—	1	—	—	70	47	0.5 / 5.5	20	—
44	17	1	15	1	—	—	—	—	1	—	—	—	—	81	94	0 / 1	18	—
45	22	8	24	1	1	1	1	—	1	—	3	2	—	66	57	1.5 / 2.5	35	—
46	14	4	9	1	4	1	—	1	—	1	1	—	—	66	35	4.5 / 2	19	—
47	23	4	15	4	—	—	—	1	1	2	—	2	—	41	48	0 / 0.5	20	—
48	31	3	27	1	—	—	—	—	1	1	—	—	—	20	9	0 / 1.5	25	—
49	12	7	5	—	1	—	1	—	1	1	—	1	—	58	50	1.0 / 1.5	10	—
50	13	2	11	—	1	1	—	—	—	—	—	1	—	30	70	1.5 / 0	15	—
51	13	5	7	1	—	—	1	—	1	—	4	1	—	50	23	0 / 3	15	—
52	11	4	7	—	—	—	—	—	—	—	—	—	—	90	81	0 / 0	12	—
53	21	9	12	—	1	1	—	—	—	—	—	—	—	73	68	1.5 / 0	25	—
54	33	4	23	7	—	—	—	—	—	2	—	—	—	51	78	0 / 1.5	28	—
55	16	5	11	—	—	—	—	—	4	—	—	—	—	58	50	0 / 4	24	—
56	34	6	29	—	3	2	—	2	2	1	—	—	1	95	50	4 / 5.5	32	—
57	57	8	44	5	4	4	1	—	2	—	1	3	—	80	49	6 / 2.5	45	—
58	21	4	17	—	2	2	—	—	—	3	—	1	1	100	52	3 / 1.5	20	—
59	42	8	33	1	4	—	1	—	—	3	—	—	—	97	33	4 / 1.5	40	—
60	41	8	34	—	—	1	—	2	3	3	2	1	—	93	56	0.5 / 8.5	45	—

color scoring and for the ratio of area and the color score from test to test. A comparison of the values in 19 subjects from whom a drawing of Series J and of Series F was obtained, shows essentially the same values for the

mean area (Series J 303 cm.^{2}, Series F 336 cm.^{2}) and for the mean color score (Series J, 2.16, Series F, 2.0). These data indicate that there is an intra-individual consistency for the area used and for the color score. They also indicate that the mean values for the area used and for the color score were not dependent upon the manner in which the directions for making the drawings were given. It would seem that no change in mean values could be observed whether a suggestion was given (Series J) or not (Series F), and, whether the time was limited (Series J) or unlimited (Series F).

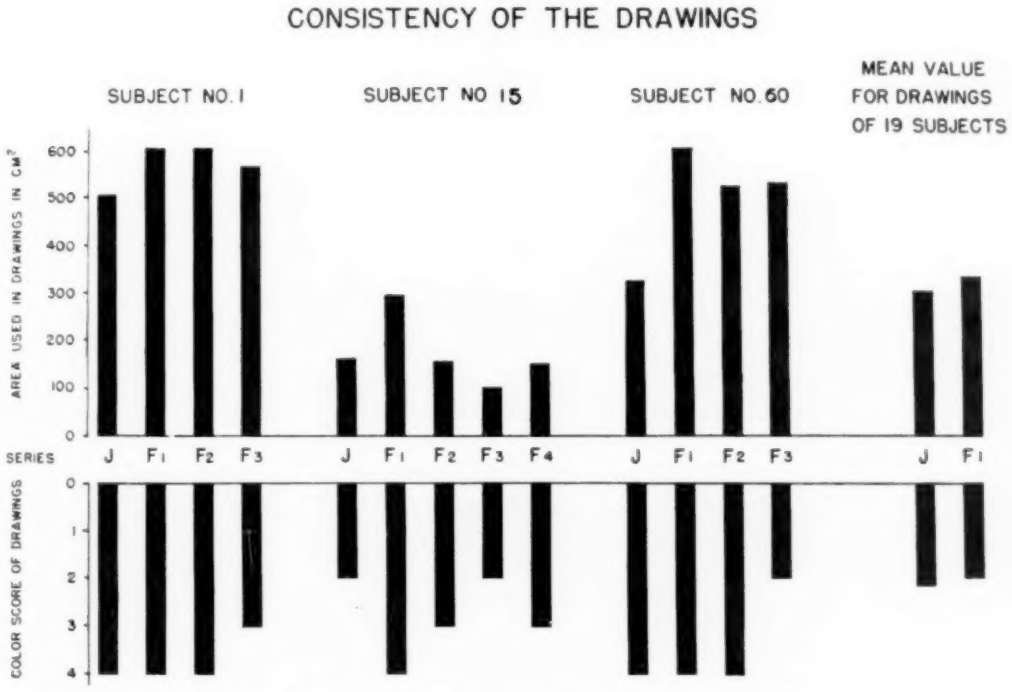

FIG. 9. The consistency of the area and the color score of the drawings of three subjects. Mean values for nineteen subjects for Series J and F are presented at the right of the figure.

A glance at the values for subjects 1, 15 and 60 (Fig. 9) indicates that in these three cases there is a direct relationship between the area used in the color drawings (Series J) and the color score. In other words, drawings occupying the greatest area are associated with high color score values. The data relating to this problem for all of the subjects in this study are presented in Fig. 10. Here it can be seen that the individuals having high color scores use larger areas in the color drawings of Series J. For example the mean value for the areas used in Series J for 11 subjects with a color score of 3 was 342 cm.^{2}, (Black columns, Fig. 10) which is to be contrasted with the mean value of 263 cm.^{2} for 17 subjects having a color score of 1.

In other words, it can be stated that individuals who use more color in their drawings tend to produce larger drawings. It was felt of interest to examine the area used by these subjects in making pencil drawings (Series S). It can readily be seen that individuals with color scores of 0, 1, 3 and 4 use larger areas in the color drawings than they do in the pencil drawings. Subjects

with the highest color scores (3 and 4) and using the greatest areas in the color drawings (Series J) have the smallest values for area used in the pencil drawings (Series S). Ten subjects with a color score of 2 showed essentially the same mean values for area in the color drawings (Series J) and in the pencil drawings (Series S). The significance of this fact will be discussed later.

When the feeble-minded group of patients is compared with the rest of the series of 40 cases, three facts can be seen. The mean area used in the color drawings (Series J) is slightly greater for the feeble-minded group (297 cm.^{2}) than that of the other subjects 277 cm.^{2}). The area used in the pencil drawings by the feeble-minded group (146 cm.^{2}) is less than that used by the other subjects (mean value 173 cm.^{2}). The mean color score of the feeble-minded group (1.3) is less than the mean color score (1.9) of the other group of cases.

The distribution of different colors in the drawings: An analysis of the distribution of the different colors used in the color drawings (Series J) is presented in the left half of Fig. 11. In order to present these values in per cent frequency, an arbitrary value of 1 was assigned to each subject for the presence of one of the following colors—red, green, blue, violet, black, white, and orange-yellow-brown, which were considered as a single group. Values were obtained for each color for the feeble-minded group and for the remaining subjects considered as a single group. For comparison the values for each color are presented

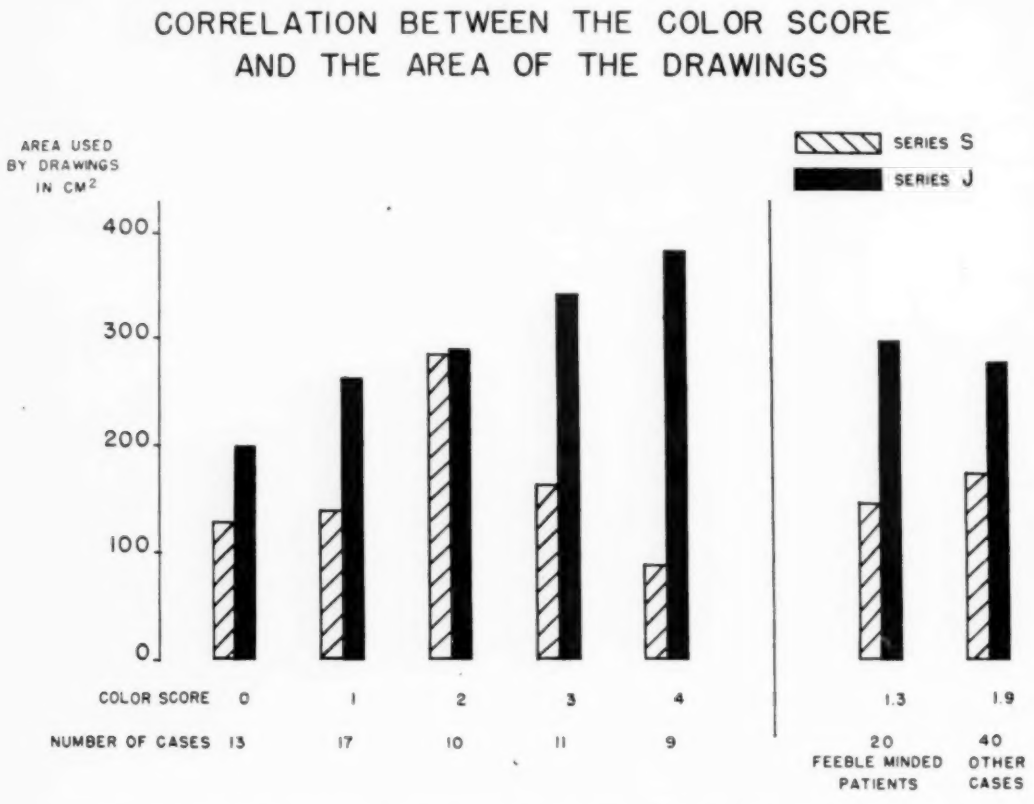

FIG. 10. Correlation between the color score and the area of the drawings. The subjects are grouped in reference to the color score and are arranged in two diagnostic groups.

for the feeble-minded group and for the other cases in per cent frequency of the total number of colors scored for each of the two diagnostic groups. It can be seen that the feeble-minded group uses red twice as frequently as does the other group. Orange-yellow-brown was also used more frequently by the feeble-minded group. Green was used with equal frequency by both groups, whereas, the non-feeble-minded group made greater use of blue and black. Neither group made much use of violet and white. This scoring does not consider the area covered by each color, yet it is of interest that during the work with the feeble-minded group, the red pencil in the box of crayons was completely used up.

B. SUMMARY OF DATA ON RORSCHACH TEST

Distribution of colors in the Rorschach responses: The distribution of colors as found in the responses to the Rorschach tests are presented in Fig. 11. This analysis includes all responses scored as *FC*, *CF*, *C* and *CY* in the summary Table B. These responses were analyzed in terms of the colors reported by the feeble-minded group and by the other subjects. It can be seen that the greatest number of responses include red. This is true for both groups, although the responses for the feeble-minded group give a greater per cent frequency. The frequencies for the other colors are considerably less. Red seems prominent in both the drawings and the Rorschach

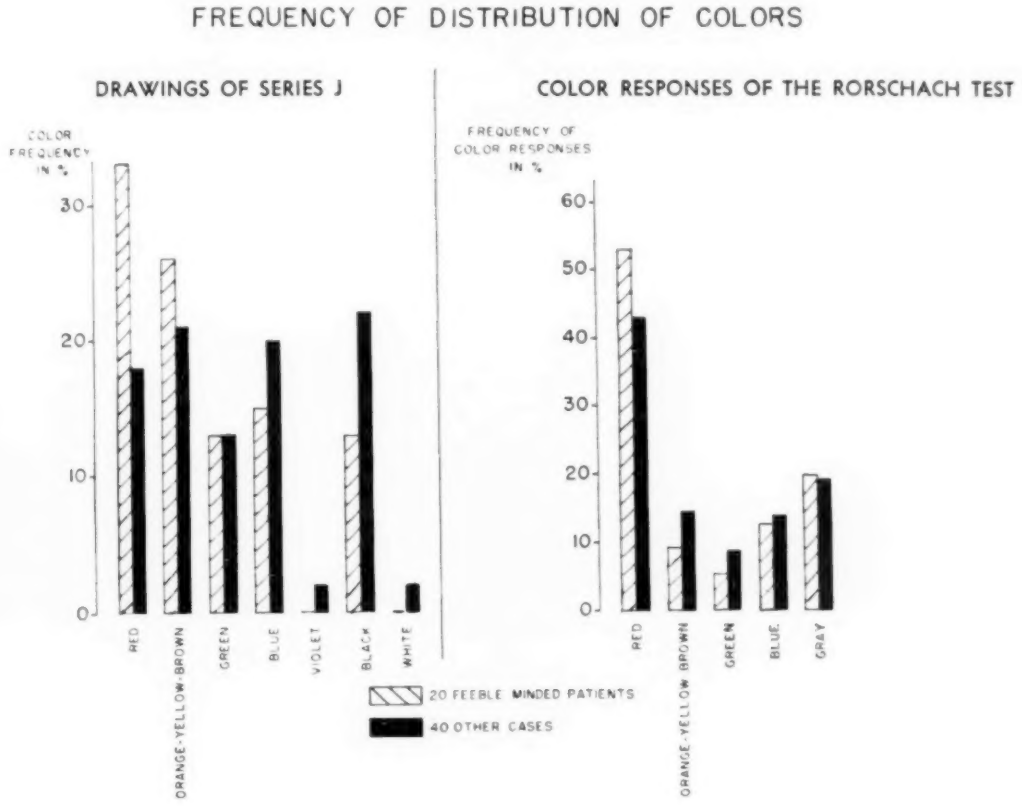

FIG. 11. Frequency distribution of colors in the drawings and in the Rorschach color responses.

responses, orange-yellow appears much more frequently in the drawings and green appears in about the same relative frequency in both the drawings and the Rorschach responses.

A further analysis of the color response in the Rorschach test was made by dividing the subjects into four groups depending on the number of color responses obtained. Subjects having color responses of 0–1, 2–3, 4–5, and 6 and over were arranged in distinct groups. For each group the total number of color responses was added and the values for each color used are presented (Fig. 12) in per cent frequency. It can be seen that 17 individuals having 0–1 color responses (first group, Fig. 12) give a smaller percentage of responses to red (32 per cent) than to gray (52 per cent), whereas, 17 cases having 4–5 color responses and 3 cases having 6 or more responses show a high incidence of red (54 per cent) and a low incidence of gray (14 per cent). It seems that a relatively greater per cent frequency for gray is found only in the individuals having 0–1 responses. In other words, subjects with a high value for their color response select red; subjects with a low color response tend to select gray. The same relationship holds if the values for the color sum or the corrected color sum (Table A) are used instead of the absolute number of color responses. Reference to this table also shows that the individuals whose Movement Sum is greater than the Color Sum (Ror-

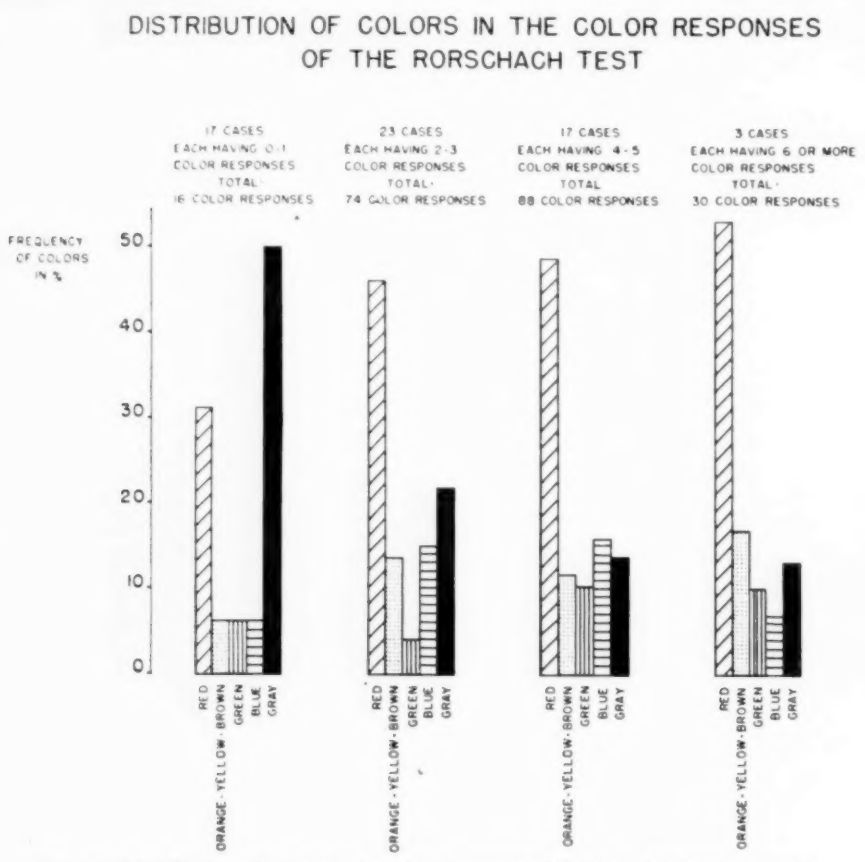
DISTRIBUTION OF COLORS IN THE COLOR RESPONSES OF THE RORSCHACH TEST
17 CASES EACH HAVING 0-1 COLOR RESPONSES TOTAL 16 COLOR RESPONSES
23 CASES EACH HAVING 2-3 COLOR RESPONSES TOTAL 74 COLOR RESPONSES
17 CASES EACH HAVING 4-5 COLOR RESPONSES TOTAL 88 COLOR RESPONSES
3 CASES EACH HAVING 6 OR MORE COLOR RESPONSES TOTAL 30 COLOR RESPONSES
FREQUENCY OF COLORS IN %
50
40
30
20
10
0
RED
ORANGE-YELLOW
BROWN
GREEN
BLUE
GRAY

FIG. 12. Distribution of colors in the color responses of the Rorschach test arranged according to the frequency of color responses.

schach's introversive type) report gray responses nearly twice as frequently (30 per cent) as do individuals whose Movement Sum is less than the Color Sum (Rorschach's extratensive type), in whom the incidence of gray is 15 per cent.

C. CORRELATION OF COLOR DRAWINGS (SERIES J) AND COLOR RESPONSES IN THE RORSCHACH

One of the purposes of this study was to correlate the analysis of the color drawings with the results of the analysis of the color responses to the Rorschach test. The results of these correlations are presented below.

Correlation between the color score in the drawings and the color response in the Rorschach test. The relationship between the color score of the drawings (Series J) and the mean number of color responses to the Rorschach test is presented in the right half of Fig. 13. It can be seen that a direct relationship obtains between the values along the abscissa and those along the ordinates. The nine individuals having the highest color score for the drawings also have the greatest number of color responses. Obversely the 13 individuals having 0 for the color score of the drawings have the lowest number of color responses in the Rorschach test. The intermediate groups continue in essentially the same relationship, which also obtains when the color score of the drawings is compared with the color sum of the corrected color sum of the Rorschach responses.

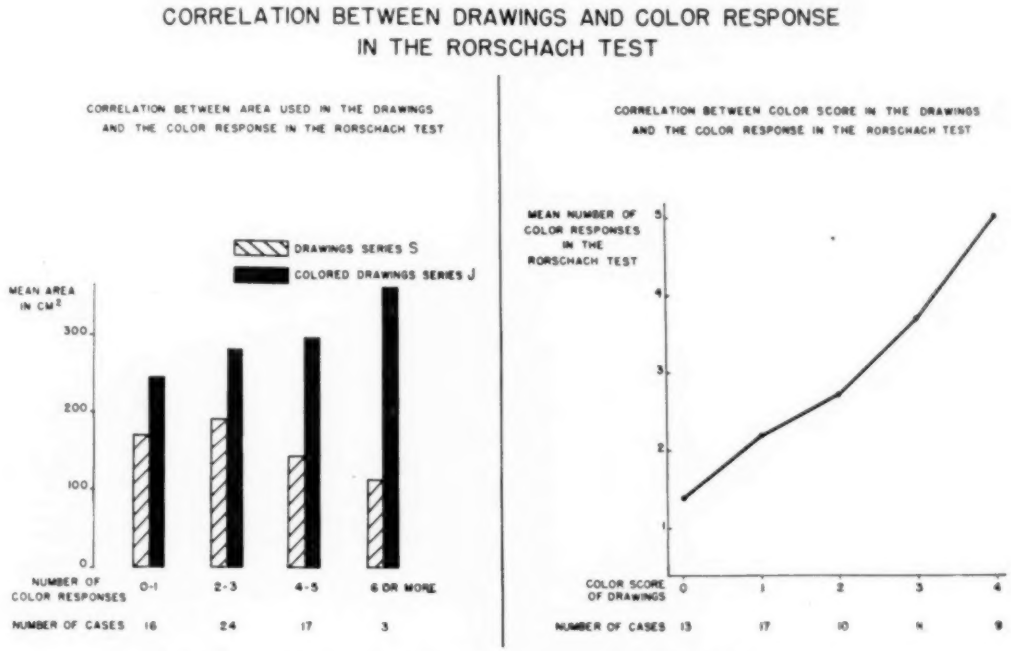

FIG. 13. Correlation between the areas and color score of the drawings (Series J) and the number of color responses in the Rorschach test.

Correlation between the area used in the drawings and the color response in the Rorschach test. The left half of Fig. 13 presents the relationship between the area used in the color drawings (series J) and the pencil drawings (series S) and the number of color responses obtained from the Rorschach test. For purposes of simplification the subjects whose number of color responses were

0–1, 2–3, 4–5 and 6 or more were arranged in four groups. The increase in length of the black bars indicates clearly that the group with the greatest number of color responses also uses the largest area in the color drawings (Series J), whereas the group with the smaller number of color responses (0–1) makes use of the smallest area in the color drawings (Series J). The reverse relationship is indicated, though not so clearly, when the area of the pencil drawings (Series S) is compared with the number of color responses. In other words, the smallest areas used in the pencil drawings (Series S) are found in individuals whose color response is high. The greatest difference between the areas used in the color drawings and the pencil drawings is found in the group of individuals having the greatest number of color responses.

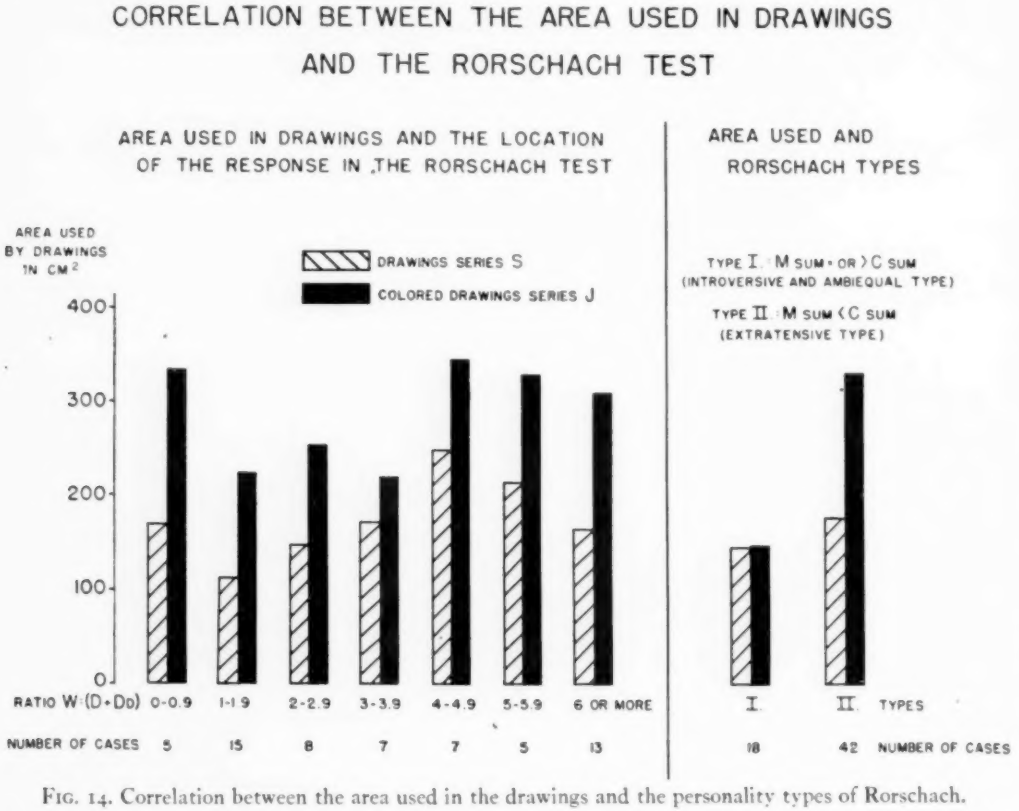

FIG. 14. Correlation between the area used in the drawings and the personality types of Rorschach.

These data indicate that there is a marked parallelism between the color score of the Rorschach test and the use of colors in drawings, as expressed by the color score and the area used in the color drawings.

Correlation of area used in the drawings and the Rorschach types. From the relationship between the *M* (movement) responses and the *C* (color responses) Rorschach described two types of personality. The extratensive type of Rorschach (*M* sum less than *C* sum) is parallel to the extroverted type of Jung (8) or the cyclothymic type of Kretschmer (3) and the introversive type (*M* sum greater than *C* sum) which is analogous to the introverted type of Jung or the schizothymic type of Kretschmer. The data obtained from the Rorschach were analyzed in terms of these two types and related to the

area used in the color drawings (Series J) and the pencil drawings (Series S) (Fig. 14, right side).

It can be seen that the area used in the color drawings is nearly twice as great for the extratensive type (Type II) as that used by the 18 individuals in the introversive or ambiequal type (Type I). The area used in the color drawings by the 42 individuals of Type II is nearly twice as great as the area used in the pencil drawings (series S). There is little difference in the area of the pencil drawings used by the two types.

Relationship of the area used in the drawings and the location of the response in the Rorschach test. The ratio of whole responses (*W*) to detail responses (*D*+*Dd*) is considered of significance in scoring the Rorschach test. Most workers accept the ratio of 1:3 or 1:4 as being characteristic of normal adults. The individuals studied were arranged in seven groups in terms of increasing ratios of *W*:(*D*+*Dd*). The areas used in the colored drawings (Series J) and the pencil drawings (Series S) for these seven groups were charted and are presented in the left side of Fig. 14. The group (7 subjects) whose ratio is 3–3.9, which represents a normal mean value for adults, shows the smallest area used in the color drawings. This group also has the smallest ratio between the area used in the color drawings and the area used in the pencil drawings (1:1.23). Both extreme groups (ratio 9–0.9 and 6 or more) have large (absolute) values for the area of the color drawings, and also have the largest ratios for the area of the colored drawings to the pencil drawings (1.9 and 2.0)

Relationship between the content in the Rorschach test and in the drawings: The relationship between the content of the Rorschach responses and that of the drawings was studied. No obvious correlation was found between the content of the Rorschach responses and that of the drawings. Of the 60 individuals who had two or more drawings, only twelve did not draw human figures, three drew pictures of animals. In the Rorschach responses the animal responses were very frequent and the answers referring to humans were much less frequent. The drawings represented either a sad or happy event, or more often a personal experience or a complaint of the patient. It seems that the patients preferred to report on more personal and intimate thoughts in the Rorschach test than in the drawings in which, as a rule, conventional topics were drawn.

Discussion

In evaluating the Rorschach test considerable emphasis has been placed upon the number and the nature of the color responses. These responses have been associated with the presence of affect and have been used as one of the elements in defining personality types on the basis of the test. The full significance of the quantitative and qualitative aspects of the color response are at present not understood. The resolution of this problem might add precision to the Rorschach test as a diagnostic method and might also give a better understanding of the factors involving the choice and use of colors.

The present study shows that a relationship exists between the color responses in the Rorschach and the use of color in drawings. Individuals who have a high color score in the Rorschach and in the drawings also make large drawings. This high positive correlation on comparing the color score of the drawings with the number of color responses in the Rorschach test (Fig. 13) is significant. The drawings and the Rorschach test represent two entirely different techniques for the study of the problem. The fact that a cor-

relation exists between the two would indicate that the orientation of the individual toward the use and selection of colors is independent of the test procedure. This fact in turn would suggest that the attitude of the individual toward the use and selection of color is characteristic at least for the time during which the tests were made. It would seem reasonable as a result of this study to believe that other aspects of behavior involving the choice or selection of color would be consistent with the number of color responses, the color sum of the Rorschach and the color score of the drawings of Series.

In connection with the problem of the use of color and its relationship to affect, many authors associate high color scores in the Rorschach with the so-called expansive type of personality. There is at present no clear definition of this type. It is of interest that in these studies individuals with high color scores in the drawings make use of relatively larger areas in producing these drawings. The reverse is also true. It is also apropos that the individuals with high color scores for colored drawings of Series J tended to make use of relatively smaller areas in the pencil drawings. If one makes the assumption that the trait referred to as expansivity is manifested by the use of larger areas in drawing one could readily believe that high color scores in the drawings and a large number of color responses in the Rorschach are also indicative of this trait. It may well be that the expansive individual is one whose affective life readily expresses itself in motor activity and represents a type of individual unhampered by the more critical rational functions. The great incidence of red in the Rorschach response and in the distribution of colors used in the drawings by individuals with high color scores indicates that the type of individual who uses many colors, and large areas in drawings has a selective capacity for red.

It has been shown that the extrovert type of Jung and the cyclothymic type of Kretchmer (δ) have a great deal in common with the extratensive type of Rorschach as defined by a relationship between the movement and the color responses. From Fig. 14 it can be seen that the individuals who fall in the extratensive type of Rorschach make use of greater areas in the colored drawings and also have high color scores for the drawings. These individuals of this type also have a high ratio on comparing the area of the colored drawings with the area of the pencil drawings. In contrast, individuals who fall into the Rorschach introversive type (color sum smaller than M sum) tend to make use of smaller areas and show little difference in area between colored drawings and pencil drawings. These individuals are similar to the individuals described by Jung as introvert and by Kretschmer as schizothymic. These facts would indicate that the extratensive individual whose interest is directed to the outside world in terms of motor activity manifests this trait also in the use of larger areas in drawing. The introversive individual tends to restrict the areas used in the colored drawings and the area values of the colored drawings for this group are essentially the same as the values obtained for the pencil drawings. The balanced type (Type 1, Fig. 14) shows a greater tendency to react to gray, in contrast to the extrovert type of individual who tends to react to red.

Another differentiation of individuals is suggested by Rorschach on consideration of the ratio between whole and detailed responses. Subjects with a normal ratio of $W:(D+Dd) = 1:3.5$ in the Rorschach test use relatively small areas in the color drawings and show little difference between the area as

used in the color and the pencil drawings.

Individuals whose ratio of $W:(D+Dd)$ is on the extreme ends of the scale (Fig. 14) show considerable difference in the area of the color drawings as compared with the area of the pencil drawings. The same situation is found on correlating the area of the drawings with the Rorschach personality types. Hence it would seem that the $W:(D+Dd)$ ratio is related to the personality types defined in terms of the ratio of M sum to C sum (experience balance).

A consideration of the feeble-minded group brings out several points of interest. In the drawings the feeble-minded subjects tend to use red very freely, much more so than did the other individuals in the series. This group also shows a high ratio on comparing the area of colored drawings with the area of the pencil drawings. In the Rorschach test the feeble-minded group has a higher value for red, but does not show an unusually striking difference from the non-feeble-minded group. This fact makes one hesitate to accept the weighted emphasis placed upon the use of red by feeble-minded people as described by some investigators (*1*). The fact that the feeble-minded group with its known limitations in the intellectual levels uses red and large areas suggests that there may be a relationship between defects in cortical structure or impairment in cortical function and the use of red and large areas in drawings. It would also imply that adequate cortical activity or emphasis on cortical activity as seen in the intellectual or rational types inhibits the reaction to color especially to red.

Summary

1. A method is presented for the analysis and scoring of drawings.

2. The results of the analysis and scoring of drawings were compared with the analysis of the color responses obtained on administering the Rorschach test to a series of 55 psychiatric and neurological patients and 5 normal control subjects.

3. High color scores in the drawings (Series J) correlated with high values for the number of color responses in the Rorschach test.

4. Individuals with high color scores in the drawings and a large number of color responses in the Rorschach test made use of large areas in the colored drawings (Series J) and small areas in the pencil drawings (Series S). This correlation held especially for the feeble-minded group.

5. Individuals of the extratensive type of Rorschach used much larger areas in the color drawings than did individuals of the introversive type of Rorschach. Individuals of the former type showed a ratio of 2:1 on comparing the area of the color drawings with the area of pencil drawings. Individuals of the introversive type had a ratio approximately 1:1 for the same comparison.

6. Subjects with a normal ratio of $W:(D+Dd)$ in the Rorschach test use small areas in the color drawings and show no striking differences between the areas of color and pencil drawings, whereas subjects with an extreme ratio of $W:Wd$ used larger areas in the color drawings and showed striking differences between the areas of color and pencil drawings.

7. High color scores in the drawings and a high number of color responses in the Rorschach test correlate with high values for the use and selection of red.

8. Red and yellow are used most frequently in the drawings. Violet and white are rarely used. Feeble-minded individuals use red more frequently than do the other subjects.

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7. High color scores in the drawings and a high number of color responses in the Rorschach test correlate with high values for the use and selection of red.

8. Red and yellow are used most frequently in the drawings. Violet and white are rarely used. Feeble-minded individuals use red more frequently than do the other subjects.

9. In the Rorschach test the responses to red are twice as frequent as responses to other colors. Feeble-minded patients respond more frequently to red than do the other cases.

10. Subjects giving a high number of color responses in the Rorschach test have a greater selectivity for red whereas subjects giving a low number of color responses in the Rorschach test tend to select gray.

11. Subjects belonging to the introversive type of Rorschach have a high selectivity for gray.

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PSYCHOSOMATIC MEDICINE—VOL. III, NO. 4, OCTOBER, 1941

BLOOD PRESSURE AND PULSE CHANGES IN NORMAL INDIVIDUALS UNDER EMOTIONAL STRESS; THEIR RELATIONSHIP TO EMOTIONAL INSTABILITY

Don P. Morris, M.D.*

IN A PREVIOUS STUDY (9) it has been shown that elevations of systolic and diastolic blood pressure and pulse rate are frequent accompaniments of states of mild emotional stress. While such a relationship has been reported by a number of authors in both laboratory and clinical experience (9), the exact significance of the changes is not well understood. In 1938 Armstrong (1) reviewed the records of 700 candidates for the aeronautical service, considering the qualifying physical examination as a situation of emotional stress. He separated into one group all those showing a systolic blood pressure of over 134 mm. Hg, a diastolic blood pressure of over 90, or a pulse rate above 90 at the time of the examination; he then compared this group with the group judged to be emotionally unstable in a personality interview and found a high degree of correlation (.88). He concluded that vascular changes of this degree might be used as an index of emotional instability, at least in the specific situation studied. In the present investigation, an attempt was made to test this thesis by comparing vascular changes under emotional stress not only with instability as determined by interviews but also with follow-up studies in sixty-two student nurses, aged 18–25, and seventeen student pilots, aged 19–25, in training under the Civil Aeronautics Authority.

By instability is meant the liability of the individual to fail in making an adjustment in the situation with which he is confronted; in this case the specific situation is the training of the student nurse or pilot. While adjustment is likewise a relative matter and has been fairly criticized by Kahn (7), for the purposes of this presentation it means a technically competent performance of the required duties and a mutually pleasant social relationship between the trainee and the majority of those with whom he is associated.

Procedure

Blood pressure and pulse reactions to emotional stress

Records of blood pressure and pulse rate were available from the initial physical examinations of the sixty-two prospective student nurses. This examination is an event of considerable importance for the student, since it may uncover some defect which will keep her from entering her chosen field. Moreover, the group studied were inexperienced; most of them had just completed high school, and only a very few had held jobs of any kind. A large majority had never had complete physical examinations before. It could there-

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The author is indebted to Dr. Fenimore Davis, Chief Anaesthetist at the University Hospital, to Asst. Professor E. B. Greene of the Department of Psychology, and to Miss Alma Miller and Miss Lucile Perry of the Department of Nursing for the use of data from their records. Observations at the airport were made by Mr. Mark Kirk, a student in the medical school.

fore be concluded that this represented for them a situation of some emotional stress. With few exceptions these students admitted at the time of the interview that they were much concerned about the results of the physical examination, and that they were apprehensive at that time.

Similarly, readings of the blood pressure and pulse rate were recorded in the qualifying physical examination of the student pilots. This examination is a focal point for concern regarding their future in aeronautical work; it is very detailed, and physical perfection is considered a prerequisite for success. Defects which may seem relatively minor in other pursuits here assume great importance. In the communications to the large group of applicants the highly competitive nature of the work is constantly emphasized, and this spirit of competition was actually present to a high degree throughout the training period. As in the case of the nurses, these candidates admitted some subjective emotional disturbance at the time of the physical examination. One of them remarked spontaneously, "The time I was most excited was when I was taking the physical exam."

While only single readings of the blood pressure and pulse rate were made in the examinations described above, at least two or three readings were made just before the student pilot's first flight, before his first maneuver such as a "spiral" or a "spin," before his first experience in the Link trainer, and following the hypodermic injection of 1 c.c. of sterile normal saline solution. Blood pressure was determined by the method of auscultation, the instrument used being a mercury sphygmomanometer of known accuracy. Pulse rate was counted by palpation of the radial artery for 20 seconds if the rate was below 80 per minute and for 30 seconds or more if the rate was elevated. At the same time an attempt was made to ascertain the individual's subjective state—first, by waiting for his spontaneous comments and secondly by asking him a non-leading question such as "How do you feel?" Also during this time the subjects were observed for external bodily manifestations of emotional stress such as flushing, pallor, tremor, excessive sweating, restlessness, or apprehensive facial expression.

After a period of study in the ground school the next most important event for the student pilot is his first flight with the instructor. Of sixteen individuals studied as described above at the time of the initial flight, only six had had any previous instruction in the air; three of the latter group had less than one hour of instruction, and even this experience had been more than one year before the time of these observations. At this time they made such comments as the following: "I feel a little excited and nervous—jumpy," "I can't wait to get up there," "A little excited, not frightened; there is a light feeling in my chest." At the same time some tremor of the extended hands was noted in six instances and flushing of the face and neck in two cases. It was concluded that this situation was likewise one of mild emotional stress for the individuals concerned.

Five students were studied as described above just before their first "spin" or "spiral." Of these all showed tremor, and four gave subjective confirmation of a state of mild emotional tension, saying, for example: "I am a little more tense than usual," "Imagine I may get a kick out of it." Similarly, of four subjects examined before their first experience in the Link trainer, three showed tremor, one exhibited excessive sweating, and two gave some subjective indication of being tense, stating that they were "a little excited." The situations mentioned were all new

to the subject, and again represented states of mild stress.

In a study of autonomic nervous system reactions (*10*) in fourteen student pilots, the effects of the injection of sterile normal saline solution on the blood pressure and pulse rate were noted before adrenalin, mecholyl, and atropine were used. Five of these students showed some sign of emotional excitement with this control injection; two were definitely apprehensive, showing this by their facial expression and by generalized tension of their muscles. Three gave subjective reports as follows: "My heart feels funny; it feels funny in my left shoulder blade," "Maybe I feel a little excited," "My heart is pounding a bit."

INTERVIEWS

The student nurses and pilots were interviewed for approximately one-half hour each, although more time was used if indications arose, and a number were seen more than once. At the time of the interview data were available concerning each student nurse's family, factual personal, religious and educational history, including a record of the extracurricular activities; of special interest was a short essay by the student on her reasons for choosing nursing as a career. A questionnaire covering family history, education, employment, home conditions, habits, sexual development, and personality characteristics was answered by each student pilot and utilized at the time of the interview. While these data were deficient in many respects from a psychiatric point of view, they nevertheless frequently gave hints of value in the conduct of the interview.

The interviews were not conducted in a routine manner. Because of individual differences, the order of questioning was frequently varied, and different portions of the general outline were pursued only as far as seemed expedient in the given case. Most often the interview was opened with a discussion of the student's interest in becoming a nurse or a pilot. Then notes were made of the number of individuals in each family who had suffered from hypertension or cerebrovascular accidents, or from nervous or mental disease; the subject was questioned systematically concerning these conditions in his parents, their collateral lines, grandparents, and siblings. The student was also questioned in regard to the presence of the following symptoms: nervousness, tension or "tightness inside," restlessness or fidgetiness, inability to sleep, loss of appetite or weight, headache, dizziness, shortness of breath, palpitation, and precordial pain. Attention was paid to the manner in which these questions were answered as well as to the content of the replies, and when there was some uncertainty, questions were repeated or re-phrased and supplementary questions were included. If any of these symptoms were found to be present, a description of them was recorded in the subject's own words. Dreams were discussed from the point of view of their relative frequency, their manifest content, and the degree of concern they caused the individual; the latter factor was judged by the manner in which he related his dreams, to a certain extent by the amount of associated interruption of sleep, and by other symptoms occurring when the individual was awakened by the dream. Inquiry regarding possible sexual conflicts on a conscious level was usually initiated by a discussion of the individual's sexual education, and his attitude toward marrying and having children. Masturbation and nocturnal emissions were discussed with the pilots and special attention was paid to their attitude toward these occurrences. Notice was also taken of such factors as heavy eco-

nomic burdens, deaths or other tragedies in the family, and prolonged unhappy family relationships. Throughout the interview, the subject was observed for evidences of restlessness, apprehension in his facial expression, tremor, flushing or pallor, excessive sweating or crying. Finally a total impression of "normal" or "possibly unstable" was recorded.

FOLLOW-UP STUDIES

Follow-up studies were made on the student nurses over a period of 12–18 months after the interviews. The sources of information included the subsequent health history, the academic record of the student, and some detailed notes concerning her adjustment on the wards and in the dormitory. If she developed a number of complaints or lost more than the usual time from her work, in the absence of physical and laboratory findings sufficient to account for her condition, this was considered as some evidence of a poor adjustment in the situation. A relatively poor academic achievement in a person of superior intelligence was considered similarly, whereas a good academic record in an individual of average or borderline capacity was considered evidence of a good adjustment. The data concerning the student's social and work relationships on the ward and in the dormitory represent the opinions of a number of supervisors and fellow students. Being well liked by a majority of these groups was considered evidence of a satisfactory adjustment. These records were examined by the writer and each case was discussed individually with the supervisor best acquainted with these records and also with the lives of the girls in the dormitories. The adjustment was then classified as "inferior or poor," "average," or "superior."

Student pilots were followed through the training period of four or five months by referring to the records of their instructors. Here the students were scored on the following four items: degree of tension during flying, inclination to "show off," ease of being upset when trouble arises, and amount of confidence. It was considered undesirable for a student to be excessively tense, to "show off," or to become easily upset in case of trouble; on the other hand, self-confidence was considered a desirable trait. The instructors attempted to estimate these factors in a quantitative way, with 20 being the highest possible score on each. The average score for the four items was usually between 15 and 17. The adjustment was considered inferior if the average score was below 13, or if the student was forced to discontinue the program entirely. In the latter case he was considered "washed up," and these records were not kept. Men were dropped from the course only after they had repeated difficulties with two or three of the four experienced pilots.

RESULTS

RELATION BETWEEN VASCULAR CHANGES AND INSTABILITY

There was no correlation between the vascular changes under emotional stress and instability according to either the interview or the follow-up studies. These data are summarized in Table I, in which the subjects are divided into two groups on the basis of the reaction of the systolic blood pressure, the diastolic blood pressure, and the pulse rate as proposed by Armstrong and discussed in the introduction above. It will be seen that approximately the same proportion of each group show evidence of instability either at the interview or in the follow-up study. The same result is obtained if the group with a systolic blood pressure of more than 130 mm. is compared with a group having a sys-

TABLE I

RELATION BETWEEN INSTABILITY AS DETERMINED BY INTERVIEWS OR FOLLOW-UP STUDIES AND TOTAL VASCULAR RESPONSE UNDER EMOTIONAL STRESS IN 79 SUBJECTS

Vascular changes under stress[1]	Systolic B.P. above 134 mm., diastolic above 90 mm., or pulse above 90	Systolic B.P. below 134 mm., diastolic below 90 mm., or pulse below 90
Total no. of nurses and pilots	25	54
No. unstable in single interview	7 (29%)	12 (20%)
No. with poor adjustment later	5 (25%)	15 (28%)

[1] Criteria proposed by Armstrong; see introduction above.

tolic reading lower than that figure, or if the group with a pulse rate higher than 90 is compared with a group having a pulse rate lower than this.

COMPARISON BETWEEN INTERVIEWS AND FOLLOW-UP STUDIES

Likewise a comparison of the results of the interviews and the follow-up studies is of considerable interest. There is not even approximate agreement between them. Thus of nineteen student nurses showing some evidence of instability according to the interview, only nine made relatively poor adjustments during the next 12–18 months, five were considered average, and five were definitely superior. Similarly there were eleven students making relatively inadequate adjustments who were thought to be quite stable at the time of the first contact.

NORMALITY OF THE VASCULAR CHANGES STUDIED

However, the evidence does indicate that blood pressure and pulse changes of the degree considered here are normal, physiological responses to situations of mild emotional stress. This becomes clear if we compare the student nurses with the pilots as to the frequency of vascular changes under stress. Thirteen of seventeen student pilots, each of whom was studied in two or three different situations, showed *at one time or another* a systolic blood pres-

TABLE II

BLOOD PRESSURE AND PULSE RATE OF AERONAUTICAL STUDENTS IN SEVERAL SITUATIONS OF EMOTIONAL STRESS

Subject	Basal readings		Qualifying physical examination		Before first flight		Other stress situation[1]	
	Blood pressure mm. Hg	Pulse per min.	Blood pressure mm. Hg	Pulse per min.	Blood pressure mm. Hg	Pulse per min.	Blood pressure mm. Hg	Pulse per min.
V.M.	119/74	73	132/70	80			130/74	96
C.G.	108/58	60	125/75	78				
R.S.	111/76	67	110/70	84			140/80	88
A.B.	115/74	73	148/70	96	145/ 90	84		
T.Q.			128/75	90			118/68	80
C.B.	108/66	62	120/80	80			128/80	76
K.D.	121/72	77	130/90	75	136/ 80	86	142/80	88
M.H.	112/73	68	118/80	63	122/ 70	74	125/88	82
C.H.	117/70	77	124/74	84	136/ 88	78	130/94	86
E.H.			118/60	84	118/ 80	88	122/80	58
E.K.	108/60	64	128/80	72	128/ 76	84	132/78	82
G.K.			110/78	78	146/ 86	58	132/98	66
C.M.			138/68	80	142/ 88	82		
J.S.	104/60	64	108/72	63	134/ 78	66	128/82	70
E.W.	112/66	68	125/70	90	145/102	50		
J.W.	121/75	75	112/78	90	148/ 84	54	142/84	64
M.K.	114/70	67			144/ 90	88	150/90	90

[1] In this column are listed readings taken before the first experience in the Link trainer, before the first "solo" flight, before the first maneuver such as a "spiral" or a "spin," or following the hypodermic injection of normal saline solution.

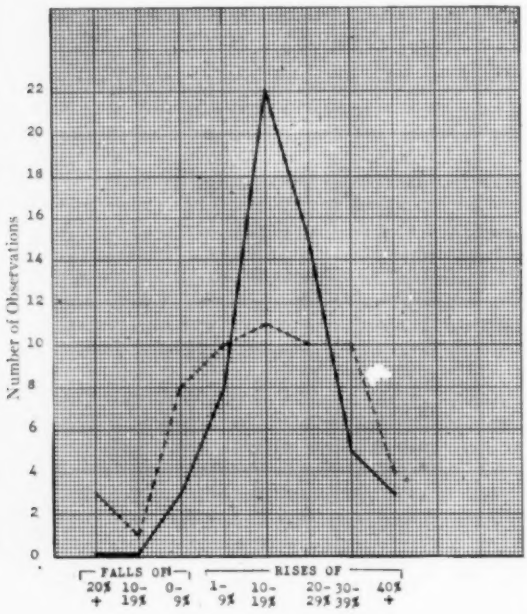

FIG. 1. Distribution of systolic blood pressure (——) and pulse changes (- - -) under emotional stress.

sure of more than 134 mm. Hg, a diastolic blood pressure of more than 90 mm., or a pulse rate above 90. This variability of response is shown in detail for the aeronautical students in Table II. On the other hand, only twelve of sixty-two student nurses, who were examined in one situation of mild stress, showed vascular changes of this degree.

The fact that these variations are so readily found in normal individuals under very ordinary circumstances is further indication that they are physiological responses. Thus in a total of fifty-seven situations studied intensively in the student pilots at this time and in the outpatients previously reported (*9*) there was an average rise in systolic blood pressure of 20 mm. Hg (18.3 per cent) and an average acceleration of pulse rate of 11 beats per minute (15 per cent). The basal blood pressure and pulse levels for the student pilots were available from the autonomic nervous system study referred to above (*10*), and were calculated by averaging the readings at the end of five preliminary rest periods.

COMPARISON BETWEEN BLOOD PRESSURE AND PULSE REACTIONS

If a comparison is made between the response of the systolic blood pressure to emotional stress and the pulse reaction, a noteworthy difference is seen. In Figure I the difference in distribution of these variables is plotted; the readings are those made in the fifty-seven situations referred to in the previous paragraph. In the case of the systolic pressure it will be noted that a large number of the responses are in the groups showing 10–20 per cent and 20–30 per cent rises. On the contrary the changes in pulse rate are more evenly distributed from one extreme to the other. Decreases in pulse rate of as much as 20 per cent and increases of 30–40 per cent are much more common than similar deviations in systolic blood pressure.

SUBJECTIVE REPORTS, EXTERNAL BODILY CHANGES

If we turn to an inspection of the other criteria used in defining an emotional state, it is noted that the subjective report does not always agree with what one would expect from a knowledge of the situation or with either the external bodily changes or the inner physiological disturbance. For example, one subject commented at the time of his first flight that he felt "no emotion, no excitement." Yet this was a new experience for him, he showed a definite tremor, and the systolic blood pressure was 27 mm. higher than his basal level.

A review of the procedure outlined above indicates that external bodily signs which are easy to observe are infrequent as compared to inner physiological changes. The former were observed in approximately half of the thirty-two situations in which the student pilots were examined, whereas

blood pressure or pulse changes occurred in nearly every instance.

FAMILY HISTORIES

In the families of twenty-four subjects, both nurses and pilots, showing systolic pressures of more than 130 mm. Hg under emotional stress, there were fifteen individuals affected with cardiovascular disease; in the families of fifty-five subjects not showing rises of this degree, there were thirty individuals so affected. Family histories of cardiovascular disease in individuals with pulse rates above 90 under emotional stress are similar to those in subjects whose pulse rate is below 90. Hence, by the method outlined, an hereditary background of cardiovascular disease has no significant influence on the results obtained.

COMMENT

The demonstration of measurable physiological changes as a result of psychogenic stimuli may have a considerable bearing on understanding the way in which symptoms are produced in anxiety states and other forms of psychoneurosis. However, before it is possible to understand completely the physiological disturbance giving rise to symptoms in individuals suffering emotional stress of abnormal intensity and duration, it seems essential to attempt to define variations which may be considered normal. The findings above suggest that systolic blood pressure elevations of 10–30 per cent above basal levels in situations of mild emotional stress are not abnormal. It cannot be assumed that lability of the vascular system under stress represents an abnormality. It is generally accepted that such variations occur during muscular exercise, during sleep, and with change in posture. Why, then, may they not be accepted as normal accompaniments of emotional stress? Indeed, the question should be raised in this connection whether more intensive study should be directed to those who *do not show* some lability of the vascular system under emotional stress. One such individual was noted in the group of pilots studied above; he never showed any physiological disturbance in what one would expect to be a stress situation; when asked how he felt at the time of his first flight he seemed singularly indifferent and commented, "I am more interested in the J-Hop tonight"; he had to be dropped from the flight training course because of "indifference and lack of concern" according to his instructors.

Furthermore, the outcome of this investigation serves to emphasize the need for conservatism in interpreting possible relationships between vascular lability and emotional instability. It was not possible to confirm the findings of Armstrong (*1*). So far as the writer knows, not many studies of this type have been carried out. In an investigation of more than 1000 college students, Cobb (*3*) found no correlation between blood pressure variations with change of posture and neurotic trends as judged by a short interview.

There are a number of difficulties inherent in this type of investigation. The concepts of "emotional stress," "instability," and "adjustment" are difficult to define; they are only relative terms, necessarily somewhat flexible. A given situation may not have the same meaning for one individual that it does for another; moreover, even in the same individual the significance of a certain type of experience may vary from one time to another. Nevertheless, if the physiology of emotional stress is to be understood as it pertains to the patient, we have to deal with such concepts, and we are forced to use the laborious method of defining and selecting situations of real meaning to the individual. This point has been stressed by Dunbar in a review of the literature on the subject (*4*), and is demonstrated again in

the results obtained by Whitehorn (*12*) who studied the effects of artificial and natural conversational stimuli on the pulse rate. Since this is the case, it would seem that further research efforts should be directed toward more careful definitions of the emotional states studied, recognition of a normal range of physiological response to stress, and study of those individuals who fail to show any lability of the vascular system under stress.

It is possible that some relationship between vascular changes and emotional instability may be brought out by more careful study of the extreme reactions—either marked lability or complete absence of lability of the vascular system. The few individuals in this study who showed systolic blood pressure or pulse changes of more than 30 per cent do not present any more evidence of instability or maladjustment than do the others. The suggestion of Armstrong (*1*) that the total vascular pattern be studied may also prove helpful in defining any relationship that may exist between vascular changes and emotional instability. Of three student pilots in the present investigation who showed rises in both systolic blood pressure and pulse rate of more than 30 per cent, one was considered unstable by the examiner and was later dropped from the course, another was considered unstable and later proved to be unreliable, and the third, who was thought to be stable at the time of the interview, made only a borderline adjustment in the training course. While the question of such relationships remains unanswered for the present, it is to be emphasized that a correlation between instability and vascular changes of a moderate degree does not hold good.

In addition to these considerations, in studies whose goal it is to find physiological changes that will assist in selecting candidates for a given performance, the suggestion is offered that more than one situation of emotional stress be studied, and that the physiological changes be correlated with follow-up study of the actual performance rather than with cross section examination. It is the writer's belief that no interview, however carefully conceived, can evaluate all the factors that may have an important bearing on the actual performance of the individual.

So far as the definition of an emotional state is concerned, it is held that the most important criterion is the examiner's knowledge of the individual studied and the way in which he would be expected to react in a given situation. The accuracy of the definition will then depend on the degree of understanding the examiner has. Introspective reports will often be confirmatory, but, as pointed out above, the presence of emotional stress is not always recognized consciously by the subject. This discrepancy will be even more marked in situations more complex and more personal than the ones considered here. The external bodily changes also may check with other observations, but it will be noted that they are relatively infrequent and are somewhat more unreliable because it is difficult to measure them without special apparatus and to establish normal standards for them.

Of the readily measurable changes, the systolic blood pressure shows the most consistent reaction to emotional stress; there is almost always an elevation, and this is usually within a range of 10–30 per cent. This fact is considered important because such changes may be useful in defining emotional states and thus assist in further research. The more specific reaction of the systolic pressure is in accordance with the work of others, though they have not emphasized the point. For example, Hines (*5*) has found consistent elevations of the systolic blood pressure with emotional stimuli and has sug-

gested that the mechanism may be a central cardiac stimulation rather than peripheral vasoconstriction. Likewise, in Armstrong's presentation (*1*), his tabulation of 99 unstable candidates shows that 78 were found to have elevations of the systolic blood pressure, whereas only 33 had accelerations of pulse rate, and 13 had rises in diastolic pressure.

With reference to changes in pulse rates, Armstrong (*2*) has stated that acceleration to 100 beats per minute under stress is abnormal and signifies a lack of stability. In this connection attention is called to the finding noted in Figure I above of a wide variability in pulse reaction and of the definite decelerations in rate found in some cases. These, in addition to the cases showing no change whatsoever, should be considered along with those showing marked accelerations of rate. In the study referred to above Cobb (*3*) found only a slightly positive correlation between tachycardias of 100 or more under stress and neurotic trends; and it has been seen in the present study that there was no correlation whatsoever between elevated pulse rates and either instability or later maladjustment. On the other hand White and Gildea (*11*), using the cardiochronograph, have demonstrated greater elevations of pulse rate under emotional stress in patients suffering from anxiety states than in normal control subjects. Likewise Hines (*6*), in his extensive experience with the cold pressor test, holds the view that the "effort syndromes" can be distinguished from the early hypertensive patients by virtue of the fact that the former show pronounced changes in pulse rate and little change in blood pressure on application of the cold stimulus. Here the observers are dealing with states of apprehension and anxiety more severe than those studied in this paper, and this fact may account for the difference in the findings.

Finally, attention must be given to the question of a possible relationship between the blood pressure changes noted under emotional stress and essential hypertension. Since systolic blood pressure elevations of 10–30 per cent under such conditions are of such common occurrence, it can hardly be assumed that all of these individuals will suffer later from hypertension. It was noted above that there was no correlation between these elevations in blood pressure and the incidence of cardiovascular disease in the family. No doubt some of these individuals will develop hypertension, but in any event these must be distinguished by some other means. Certainly, early hypertension must not be assumed from a single reading, or *even from several readings* if apprehension is still present. MacKenzie (*8*) makes the statement that temporary rises in blood pressure cannot be disregarded and that rises of more than 15 mm. must be considered indicative of potential or actual hypertension. Such a conclusion hardly seems justified in view of the evidence presented here. The real problem would seem to be to study any individuals who show a temporary change by some other method such as that proposed by Hines (*5*) and then to correlate this data with long term follow-up studies, such as the records of insurance companies might provide. It is clear that the attitude of the medical examiner is of great importance in eliminating anxiety from the routine examination, and that the value of repeated observat[illegible] will be to some extent dependent o[illegible] cho-logical factors present at these times.

Conclusions

1) There is no correlation between moderate blood pressure and pulse changes under emotional stress and emotional instability or later difficulties in adjustment.

2) When several situations of emo-

tional stress are studied in the same individual, reactions of this type are so common that they may be considered the normal physiological response.

3) Of the three variables studied in relation to emotional stress—systolic blood pressure, pulse rate, and diastolic pressure, changes in the first are most common and easily defined, consisting usually of elevations of 10–30 per cent above basal levels.

Summary

Sixty-two student nurses at the University Hospital and seventeen student pilots in training under the Civil Aeronautics Authority were interviewed for approximately one half-hour each in order to determine the presence of emotional instability. Follow-up studies on the first group covered a period of 12–18 months, on the second group 4–6 months. The nurses were under some emotional stress at the time of the physical examination required for admission to the school, and blood pressure and pulse readings were available from these examinations. The student pilots were studied more intensively in several situations of emotional stress including the qualifying physical examination, the first flight, the first "solo" flight, the first "spin" or "spiral," the first experience in the Link trainer, and the injection of normal saline solution at a time when the subject expected some physiological effect from a drug. At these times blood pressure and pulse rate were each recorded several times, a subjective report was obtained, and the individual was observed for the presence of pallor, tremor, flushing, excessive sweating, restlessness, and apprehensive facial expression.

In the situations studied in this manner systolic blood pressure elevations of 10–30 per cent were extremely common. The reaction of the pulse rate was more variable; there were decelerations of 20 per cent and accelerations of 40 per cent or more. With both the nurses and the pilots there was no correlation between such changes in pulse rate and blood pressure and instability as determined by the interview or difficulty in adjustment as determined by the follow-up study. In fact, when several situations of emotional stress were studied in the same individual, vascular reactions of the type outlined were so common as to constitute the normal physiological response.

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BRAIN POTENTIALS AND MORPHINE ADDICTION

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INTRODUCTION

IT IS WELL KNOWN that morphine has a central nervous system action, and several workers have reported the effects of single doses of morphine on the electroencephalogram (Berger, *2*, *3*; Gibbs, Gibbs, and Lennox, *9*). It is well known that repeated administration of morphine results in a physical dependence of the organism on the drug. This ability to produce physical dependence, or addiction, appears to be peculiar to the phenanthrene derivatives of opium.

The withdrawal of all opiates from an addict results in such striking physiological and psychological phenomena that one is immediately impressed by the profound effects of addiction on the normal autonomic and cerebral balances of the body. The usual objective signs of drug withdrawal, in the approximate order of their appearance are shown in Table I (Small, Eddy, Mosettig, and Himmelsbach, *17*).

TABLE I
THE ABSTINENCE SYNDROME

Mild	*Moderate*
Yawning	Muscle tremor
Lacrimation	Gooseflesh
Rhinorrhea	Loss of appetite
Perspiration	Dilated Pupils
Marked	*Severe*
Rise in temperature	Vomiting
Increase in respiratory rate	Diarrhea
Restlessness	Weight loss
Rise in blood pressure	

In addition to these objective signs there are psychological factors not susceptible to objective evaluation. These are primarily anxiety and apprehension and a loss of the emotional tranquility which existed when an adequate amount of the drug was administered (Himmelsbach, Andrews, Felix, Oberst, and Davenport, *11*). These factors have been shown to have a marked effect on the alpha rhythm in normal individuals.

It seems, therefore, that a complete study of the effects of morphine on the electroencephalogram should include a study of addiction as well as the effects of a single dose on an individual who has never been addicted. It is obviously impossible, except in a rare, isolated case to study an individual before the onset and during the progress of addiction. It is necessary to start with the addiction state and observe any changes which may occur following withdrawal of the drug. The present study is, therefore, incomplete, in that it is not possible to say whether or not a permanent change has been produced by the addiction and the recovery.

METHODS

APPARATUS

A four channel amplifier-oscillograph system with photographic recording was used in the present study. The overall response of the system was linear from 1 cycle to 200 cycles, the cut-off point of the low pass filters inserted in each amplifier. All amplifiers were carefully matched for frequency response and sensitivity.

Either collodion-cemented silver electrodes or the suction cup type (Andrews *1*) were employed. Identical records were obtained from the two types and

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no differences can be attributed to a difference in the electrodes. Hair was clipped to insure good contact under each electrode and was kept clipped so that identical electrode placements were obtained on the subsequent runs.

In all cases the standard electrode placements of Jasper and Andrews (Jasper and Andrews, *12*) were used. In most cases only right frontal, right precentral, right and left occipital pairs were applied, although in some cases full bilateral placements were used. Both bipolar and monopolar records were taken from these electrodes, the two ears connected in parallel being used in the monopolar recording.

The patient was maintained in either a sitting or a reclining position in a darkened, electrically and acoustically shielded room. An observer in the room with the patient signalled movements and any period during which the patient's eyes were open. The observer, through his presence and innocuous conversation between the taking of records, prevented the patient from becoming drowsy without interfering seriously with the state of relaxation necessary for obtaining the normal electroencephalogram.

Light stimuli were obtained from a 50 candlepower automobile headlight bulb equipped with reflector and condensing and projection lenses to produce a high intensity beam. The incidence of the light stimuli were recorded with a vacuum type photoelectric cell having a negligible time lag.

ADDICTED PATIENTS

No patient was admitted to this group until he had been shown to have a well established physical dependence on morphine. Following his admission to the hospital all opiates were withheld until the characteristic abstinence signs appeared in sufficient intensity to insure the presence of addiction of at least a moderate grade, as determined by the criteria described by Himmelsbach (Small, Eddy, Mosettig, and Himmelsbach, *17*). Morphine sulfate was then administered in an amount sufficient to prevent the appearance of the physiological signs of abstinence. All morphine was given subcutaneously in four daily doses of equal size, at 6:00 A.M., 11:00 A.M., 5:00 P.M., and 10:00 P.M.

The patients were maintained on this stabilization dosage for at least 7 days. Near the end of this period of stabilization an electroencephalogram was taken just prior to the 11:00 A.M. dose (5 hours after the preceding dose). Immediately following the electroencephalogram the regular injection was given. A second record was taken about 45 minutes after the injection, when the drug effect was presumably maximal.

At the end of this period of stabilization morphine was abruptly and completely withdrawn. Attempts were made to obtain records at intervals throughout the withdrawal period, but due to intense physical discomfort cooperation was poor in many cases and in others necessary treatment prevented the carrying out of the complete brain potential program.

Many of the patients left the institution soon after withdrawal. Those who remained for a longer period were studied at 30-day intervals for nine months following withdrawal of narcotics.

POST ADDICTS

For purposes of comparison records were taken on a group of fifty men known to have been addicted, but who had received no narcotics for at least one year. In selecting this group from the hospital population all patients with possible psychosis, syphilis, head injury, or a mental age below twelve were discarded. No patient who had a record of infraction of institutional rules was accepted in this group.

SINGLE DOSE STUDIES

These were carried out on a carefully selected group of men who had been addicted, but who had received no drugs for at least one year. In these experiments a record was taken prior to injection and at hourly intervals thereafter until the subjective drug effects had disappeared. The effects of a single dose on individuals who had never been addicted were tested on three members of the civilian personnel.

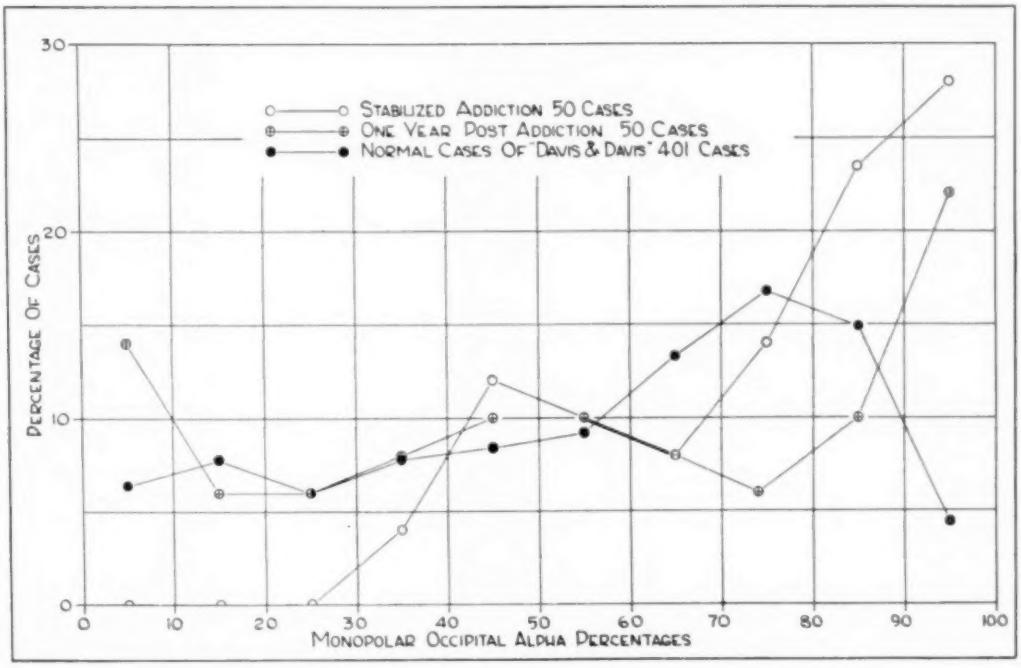

Fig. 1. Alpha index distributions for the addict and post addiction groups compared with the normal distribution of Davis and Davis.

MEASUREMENTS ON THE RECORDS

Measurements of the percentages of time alpha activity present were made on a thirty-second sample of record, carefully selected as being representative of the total record. Any group of less than three waves was not counted, and activity of less than five microvolts was disregarded. Frequency measurements were made on groups of three waves, the assigned frequency being the mean of thirty measurements. Beta activity, when present, was measured in the same way. The frequency distribution has been determined in some cases by projecting the records to a constant enlargement and measuring the intervals between the peaks of 600 successive waves. This method is tedious and does not, perhaps, have the resolving power of that used by Grass and Gibbs (*10*), but some information can be obtained from these measurements.

The records were carefully studied for the presence of delta waves, groupings, and any characteristics which might be of significance.

Results

ALPHA PERCENTAGE

A group of fifty men was studied during maintained addiction to morphine.

The most striking feature of all records taken on this group was the abnormally large amount of alpha activity, which was present to some extent in all leads. With monopolar recording the lowest occipital alpha percentage found was thirty-one per cent. Fig. 1 shows the monopolar occipital alpha percentage

proach to the "normal" group of Davis and Davis.

The group whose active addiction had terminated at least one year previous to the taking of the records showed an occipital alpha distribution different from either that of the addict or the normal group. The lowest percentage

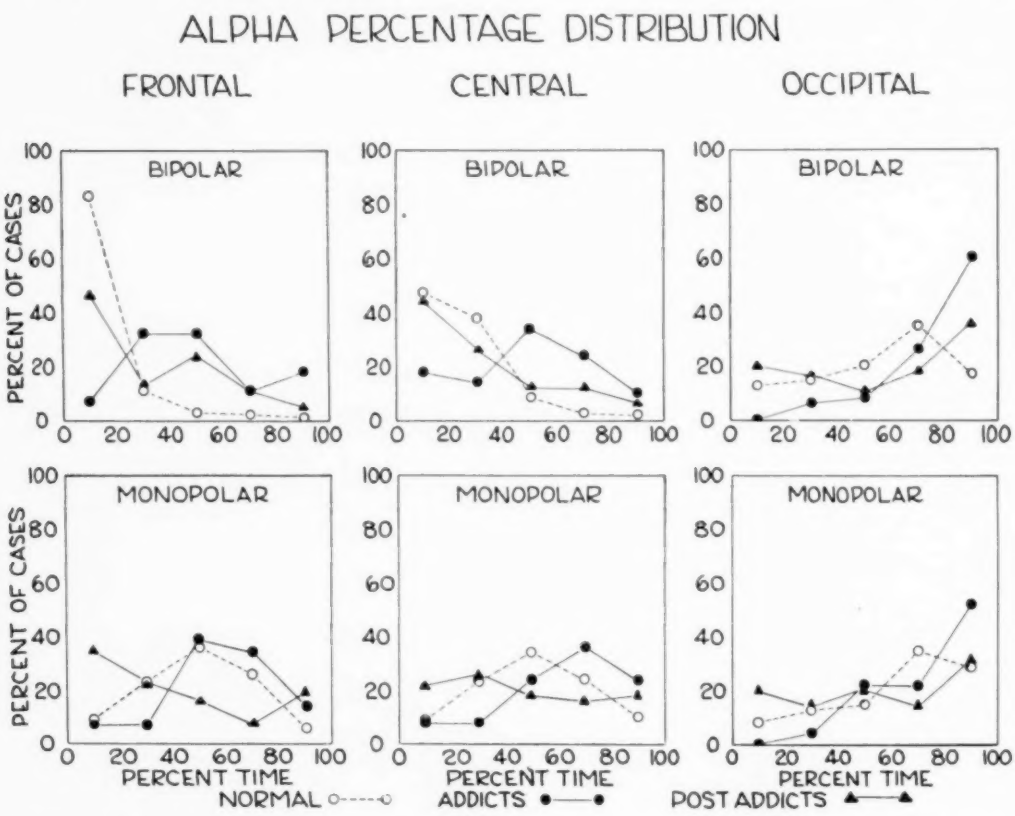

FIG. 2. Alpha percentage distributions for the addict and post addiction groups for various recording conditions. The normal distributions found by Jasper, Fitzpatrick, and Solomon are included for comparison.

distribution for this group compared with the corresponding distributions of the post addict group and that found by Davis and Davis (7) for a "normal" group.

The actively addicted group is characterized by the complete absence of any alpha percentage below thirty and by an abnormally large number of individuals in the 80–90 per cent and 90–100 per cent groups. Only in the 30–60 per cent range is there any ap-

decade was abnormally high, but above this the curve agreed quite well with the normal curve until the 60–70 per cent decade was reached. Here the post addict curve dropped below and continued well below the normal curve until the 90–100 per cent decade was reached. There appears to be a tendency for the post addicts to fall into either of the extreme percentage decades, this being accomplished at the expense of the 60–90 per cent range,

which contains a high percentage of the normal group.

Distribution curves for each of the head regions studied are shown in Fig. 2 where the "normal" distributions found by Jasper, Fitzpatrick, and Solomon (*13*) are shown for comparison. In all cases except the frontal monopolar tic and schizophrenic groups as given by Jasper, Fitzpatrick, and Solomon.

The decrease in occipital alpha index following drug withdrawal which would be predicted from a comparison of the two distribution curves has been observed in individual cases. In some individuals the high alpha index found

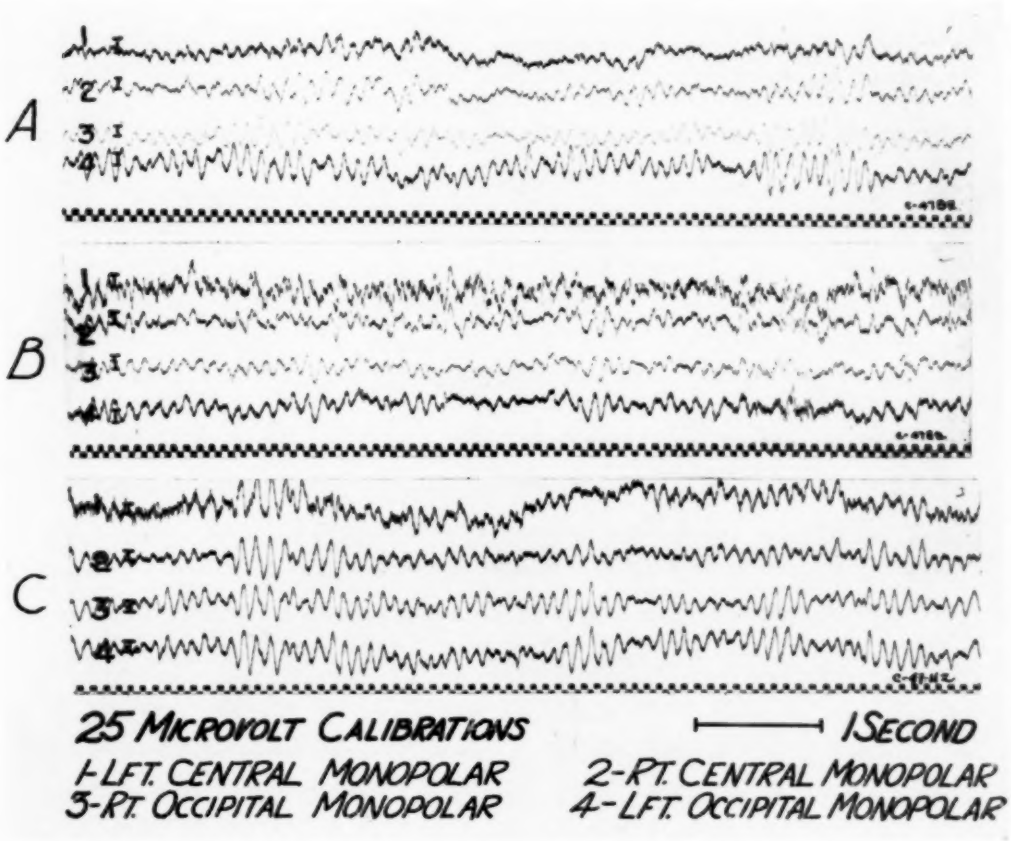

FIG. 3. Records taken: A) during maintained addiction; B) 19 hours after abrupt withdrawal of morphine; and C) 30 days after withdrawal. The high alpha percentage is maintained during withdrawal and recovery.

the "addict" curve is the highest in the high percentage group and the lowest in the low percentage group. Neither the "addict" curve nor the "post addict" curve approaches the "normal" curve except possibly in the bipolar central and monopolar frontal.

There is no better agreement between the distribution curves of the present groups and those of the epileptic during addiction is maintained during the active phase of withdrawal and throughout the recovery period, Fig. 3. In other cases the high alpha percentage is maintained during active withdrawal, but is found to have decreased sharply fifteen days following the last dose of morphine, Fig. 4. In these cases the low level is maintained, with small fluctuations, throughout a period of

several months, and apparently represents the true cortical activity of the individual when not addicted. These represent the two types of changes which occur following withdrawal. The third type, an increase in alpha activity following withdrawal, has never been observed.

The exact time at which the drop in alpha output occurs has not been determined. The physical dependence in each of the groups studied was of sufficient intensity to require the use of sedatives or opiates during the most severe withdrawal period, and it was felt that any records taken soon after this type of medication would be of doubtful value. These medications were usually given on the second, third, or fourth day of abstinence and probably do not interfere with the records taken on the fifteenth day.

The acute period of withdrawal is particularly interesting. During this period the patient is extremely restless, nauseated, and is in general exceedingly uncomfortable. Because of involuntary muscle spasms all records taken during this phase of withdrawal show many artefacts. Between these periods of disturbance, however, the alpha output is usually as great, both in amplitude and amount, as during the stabilization period, when the patient was comfortable and capable of good relaxation and cooperation. This high alpha output has

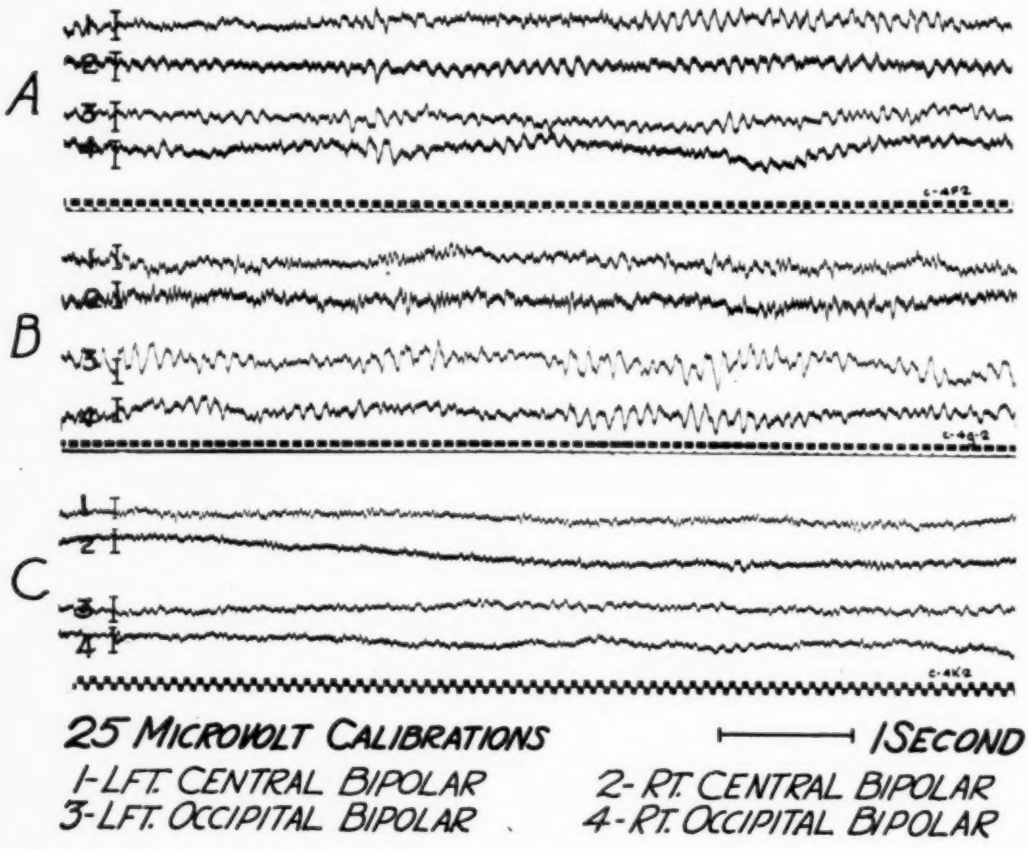

FIG. 4. Records taken: A) during maintained addiction; B) 24 hours after abrupt withdrawal; and C) 15 days after withdrawal. B) shows an increase in precentral beta activity, and the occipital alpha rhythm was still present. In C) practically all alpha activity has disappeared.

been followed for sixty hours after the abrupt withdrawal, which includes the most intense abstinence period.

The effects of the stabilizing dose are not clear cut. There is a tendency toward a slightly greater alpha percentage following the injection, but this is not a universal finding.

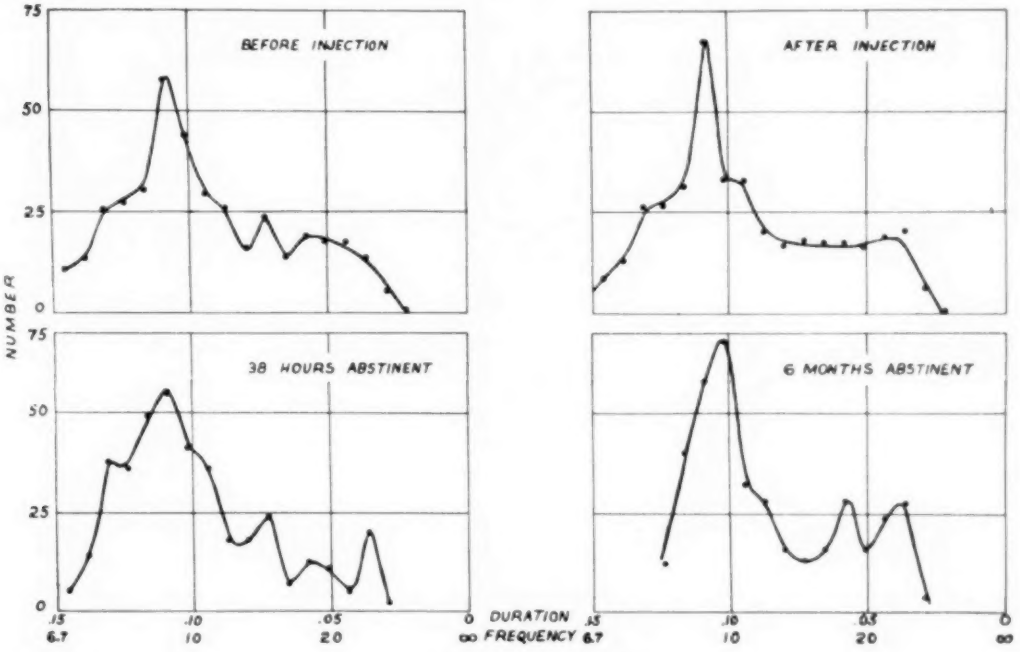

FIG. 5. Frequency distributions during addiction, withdrawal, and recovery. The counts were obtained from a patient who showed a good alpha rhythm following withdrawal.

FREQUENCY DISTRIBUTION

The frequency distribution curves during maintained addiction show that there are many components in the records having frequencies different from that of the alpha rhythm. Some records show an appreciable amount of a 16 to 20 cycle rhythm, but in the group as a whole this is not greater than would be expected from a normal group (Jasper, Fitzpatrick, and Solomon, *13*). The alpha rhythm appears to be an abnormally broad band during addiction which in some cases is sharper following the stabilizing dose, Fig. 5. There is little change in frequency during addiction and active withdrawal, but following clinical recovery there is an increase in the alpha frequency. This can be seen in Fig. 5.

The mean alpha frequency of the post addict group was significantly higher than that of the addicted group, Table II.

TABLE II

MEAN OCCIPITAL ALPHA FREQUENCY

	Addiction 50 cases		Post addiction 50 cases	
	Freq.	Std. Dev.	Freq.	Std. Dev.
Bipolar	9.6	0.79	10.2	0.81
Monopolar	9.5	0.75	10.2	0.74

Critical ratio of mean bipolar frequencies 4.9.
Critical ratio of mean monopolar frequencies 6.3.

DELTA ACTIVITY

The delta wave content of the two groups was scarcely greater than that

to be expected in a normal group (Grass and Gibbs, *10*). The delta activity consisted either of regular series of from three to ten waves with a frequency of from four to six per second or of irregular long duration pulses not regular enough for a frequency measurement.

stimulation lasting for perhaps two hours, during which time the patient was more active, talkative, and gregarious. This gradually shaded to the normal or to a slightly depressed state.

The preinjection cortical activity varied from almost one hundred per

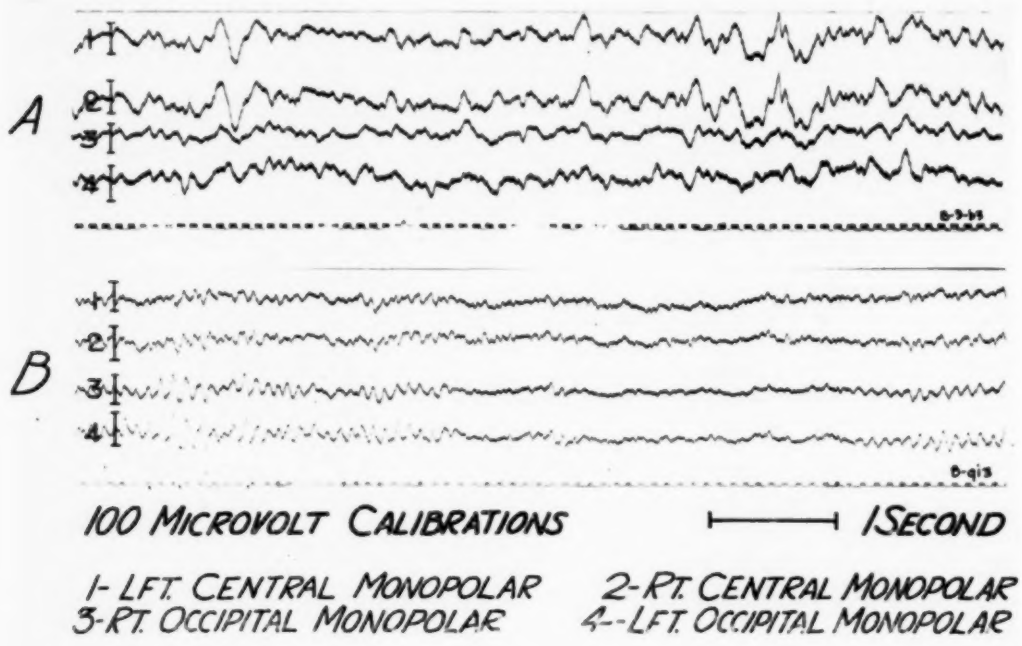

FIG. 6. Records taken from the most severely addicted patient studied. During addiction A) the entire activity is of delta frequency. Six months after withdrawal B) a regular alpha rhythm has replaced the delta activity.

The amplitude of this delta activity seldom exceeded one hundred microvolts. In a few cases in the addicted group where there was considerable delta activity this was found to be substantially reduced following withdrawal. Fig. 6 shows an example of this taken from the most strongly addicted individual studied.

SINGLE DOSE STUDIES

Five individuals whose addiction had been terminated for at least a year received a single subcutaneous dose of 20 mg. of morphine. The subjective effects usually consisted of a period of mild

cent occipital alpha in one case to nearly zero per cent in two other cases. In no case was there any significant change in the brain potential rhythms following injection. There was, however, a tendency for the occipital alpha blocking time to increase following injection. This increase in most cases is on the borderline of statistical significance. Following a single dose of morphine there is an increased variability in the alpha blocking times and some light stimuli produce only a slight reduction in the amplitude of the rhythm. In each case the patient reported seeing the light, but the universal report was that

the light seemed weaker after the drug.

When a single dose of only 12 to 15 mg. of morphine was administered to a subject who had no previous addiction history the subjective effects were very marked. Nausea, even to the point of vomiting, lassitude, and a general depression were common experiences. There was no evidence of the excitement phase observed in those who had been previously addicted. The subjective effects were quite out of proportion to the changes in the brain potentials. In two cases there was no appreciable difference between the records taken before and those taken after the morphine, except for the blocking time of the alpha rhythms. In the third case there was a striking change from a high percentage alpha record to a typical sleep pattern at three and four hours following injection. This record, Fig. 7, corresponds closely to the D stage of sleep (Loomis, Harvey and Hobart, *15*) but the patient was definitely not asleep during the recording. When this record was taken he was distinctly "gastric conscious," had gaseous eructations, and was very quiet in a desire to prevent emesis. He responded readily when spoken to, both immediately before and after the records were taken. During this period the alpha rhythm could be brought back temporarily by repeated light stimuli or sound stimuli.

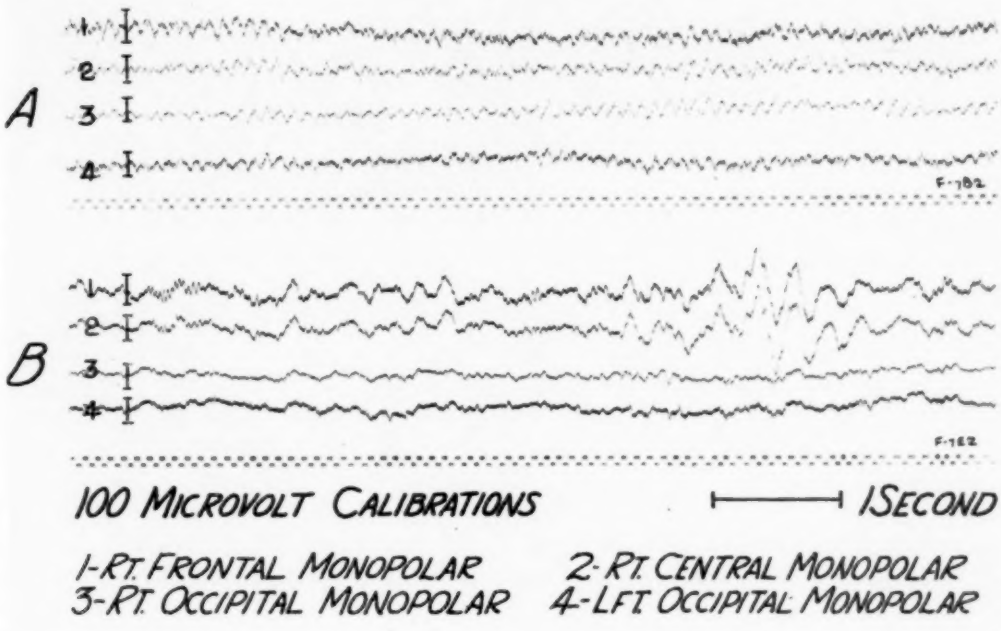

FIG. 7. Records from an individual with no addiction history taken A) before and B) 3 hours after the injection of 12 mg. of morphine.

DISCUSSION

The alpha percentage distribution curves indicate that neither the addiction nor the post addiction group constitutes a normal series. The high alpha percentage found during addiction together with the lowered alpha frequency, suggest that there is a lowered state of excitation in the corticothalamic system during addiction. This might be the result of a slightly reduced oxygen utilization by the cortical cells

since it has been shown that the first change in the electroencephalogram during the breathing of a mixture deficient in oxygen is the appearance of the alpha rhythm in the records originally showing none (Davis, Davis, and Thompson, *6*).

Bremer (*5*) has shown in cats that reducing the number of afferent impulses reaching the cortex by a transection of the brain stem above the colliculus results in an increase in the spontaneous cortical rhythms. Such a transection produces a cortical state very similar to that found in either natural or barbiturate sleep. The abnormally high alpha percentages observed during addiction could, therefore, be explained by a reduction in the number of afferent impulses reaching the cortex.

At least some of the physiological changes produced by addiction appear to be irreversible. This is supported by the fact that the post addiction alpha distribution curve is quite different from that found for a normal group. This difference might be explained by assuming that individuals with particular amounts of alpha activity are predisposed to drug addiction, but there is no evidence to support this view. Men who have been previously addicted tolerate with no signs of discomfort, and in most cases with genuine pleasure doses considerably greater than those required to produce very definite discomfort in persons with no previous drug history. It seems doubtful that this subjective difference can be accounted for by the memories of the pleasures of previous addictions.

The fact that the regular high percentage alpha continues through the period of acute withdrawal is of some importance. This stage of withdrawal is characterized by a complete loss of the emotional tranquility which has been thought to be necessary for the production of a regular alpha rhythm. Jasper, (*14*) has shown that the anxiety states associated with anxiety neuroses also are characterized by a low alpha output. It seems clear that the emotional disturbances together with the concomitant autonomic changes which occur during withdrawal are quite different phenomena from the emotional disturbances previously described as influencing the electroencephalogram.

Because of the comparatively small effects of addiction and withdrawal on the electroencephalogram it seems certain that the primary action of morphine is not on the cortex or the cortico-thalamic circuits which Dusser de Barenne and McCulloch (*8*) and Bishop and O'Leary (*4*) have shown to be necessary for the maintenance of the normal spontaneous cortical rhythms. In very severe addiction it appears that the cortico-thalamic system can become involved, for in a few cases, all with strong physical dependence, there is considerable delta activity during addiction which disappears following withdrawal, Fig. 6.

The most probable region involved is the hypothalamus. Ranson, (*16*) has shown in monkeys that bilateral lesions in the lateral portions of the posterior hypothalamus are followed by somnolence lasting for several months. The animals can be aroused for a short time but return promptly to the somnolent state when the stimuli are removed. When a non-addict is given a single dose of morphine a depressed state approaching somnolence, but which is definitely not sleep, persists for several hours. In one case the cortical potentials recorded during this period showed a typical sleep pattern, even though the patient was not asleep at the time, Fig. 7, and were temporarily returned to a normal alpha rhythm by intense stimuli. Gibbs, Gibbs, and Lennox (*9*),

found in one epileptic patient following morphine administration the abnormal spike potentials previously seen only when the patient was asleep. The suggestion that morphine action is primarily hypothalamic is strengthened by a consideration of the objective signs of withdrawal, most of which can be elicited by the stimulation of appropriate hypothalamic regions.

Summary

Brain potential records have been taken on a series of fifty men during maintained addiction to morphine, and on a second series of fifty men whose addiction had been terminated for at least one year.

Neither group shows alpha percentage distribution curves in agreement with those found by other workers for normal groups.

The addiction state is characterized by an abnormally high alpha output.

In some cases the high alpha index is maintained following withdrawal, while in others there is a sharp drop.

Abnormal rhythms were found in severely addicted patients and these were greatly reduced following withdrawal.

In general, a single dose of morphine in a non-addict had no appreciable effect on the cortical potentials. In one case, however, sleep rhythms were recorded when the patient was definitely not asleep.

The high alpha output was maintained during the active phase of withdrawal, in spite of a high degree of emotional tension, a factor which usually abolishes the alpha rhythm.

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THE INVOLUTIONAL PSYCHOSES: A SOCIO-PSYCHIATRIC STUDY*

WM. MALAMUD, M.D., S. L. SANDS, M.D., AND I. MALAMUD, M.A.**

THE QUESTION as to whether or not the involutional psychoses should be regarded as a distinct reaction type, specifically related to the problems introduced by this stage of life is of more than simple nosological significance. It influences materially the orientation and points of emphasis of any investigation dealing with the understanding of the process or its treatment. Are we to regard these psychoses as essentially manifestations of other processes, such as the manic-depressive group, which just happen to show themselves at this period of life and at most are only modified by it? Are they part of the climacterium and expressive of just another phase of the disturbed physiology of the endocrine system? Or do they represent the result of an interaction of certain types of personality organization and social impacts which have rendered the individual incapable of facing the adjustment crisis specific to the involution in a broader sense? In the historical resumes of this subject as found in the contributions by Jelliffe (*3*), Palmer and Sherman (*6*), Brew and Davidoff (*1*) and others, we can follow this influence quite clearly. Of the variety of trends that have developed since the formulation of the concept of this disease we wish to emphasize particularly the following: In 1907 Dreyfus (*2*) advanced the view that the Involutional Melancholias belonged to the category of the Manic Depressive Psychosis. For a long time this was generally accepted and even today we find some textbooks that represent this point of view. As a further extension of this idea we have the attempts to relegate in a similar fashion the other varieties of the Involutional Psychoses to such categories as the Schizophrenic, the Organic and the Psychoneurotic. The results of such an orientation is obvious. It tends to shift the point of emphasis away from problems that are specific to the involution.

Opposed to this point of view there has developed recently a trend toward regarding this disease as primarily due to the physiological factors introduced by the climacteric change in the endocrine system. The contributions in this direction have come mainly in relationship to treatment. Although many endocrinologists have been cautious in their conclusions some of them have made more drastic assertions and we find that Werner (*13*) and his co-workers regard the Involutional Melancholias as essentially severe symptoms of the menopause. They conclude not only that theelin is curative in all uncomplicated cases but that this drug may actually be used as a therapeutic diagnostic test. This orientation as contrasted with the previous one does emphasize the importance of one of the features of the involutional period but fails to take into account the fact that the process of involution affects all aspects and fields of interest of the individual and that, furthermore, differences in personality and social settings must be of importance in influencing the type of reaction in each case.

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A number of investigations reported during the last few years have shown both of these contentions to be untenable. In his discussion of Involutional Psychoses, Noyes (*5*) points out that he fails to find justification for considering them as primarily due to the physiological endocrine disturbances. A similar conclusion is reached by Palmer and Sherman (*6*) in their exhaustive study of a series of cases in which they find that Involutional Melancholia is a distinct process and one in which the most important considerations should be given to the pre-psychotic personality and its development and the particular social and psychological occurrences that take place before the onset of the actual psychosis. As regards the differentiation of this disease from the manic-depressive psychosis, the above authors and a number of others have treated the subject in a way which, at least to us, appears fairly conclusive. It is true that depression forms one of the central features in most of these pictures but the concomitant symptoms which are perhaps as important are so distinctly different from the manic-depressive picture as to render it a definitely different form of reaction. To consider the Involutional Psychoses as primarily the expression or result of changes in the endocrine system and particularly to think that they can be successfully treated by gonadotropic agents has been shown by a number of reliable investigations to be without any foundation. Schube (*10*) and his co-workers have reported results that are diametrically opposed to those of Werner and they are supported by a number of other investigators such as Wittson (*14*), Notkin (*4*), Pollack (*7*), Ripley (*9*) and others. It is important to point out that some of these authors base their conclusions not only on the therapeutic failure of the endocrine preparations but also on the fact that the psychoses frequently develop long after or even before the onset of the endocrine changes and seem to be much more closely related to other factors in the life of the patient.

If then, these reactions are to be regarded as specifically related to the involutional period, but, at the same time, not explainable on the basis of the climacterium alone a search must be made for factors other than the endocrinological that may influence and characterize this syndrome and to ascertain whether exaggeration of these factors may not be responsible for a pathological reaction. It is logical to suppose that when the nature of these factors is recognized we should be able to gain a better insight into the development of this process and therefore, also be better able to organize preventive and therapeutic measures. The implications, however, of such investigations extend further than this. On the one hand it is a well known fact that personality disturbances of the involutional type do not all lead to psychotic reactions and hospitalization. Vastly more numerous are those cases that remain on the outside but go through years of minor disturbances such as irritability, fatigability, mild depressions, loss of zest for life, decreased efficiency in work and so on (*8*). Preventive and curative measures, therefore, would be applicable not only to institutional work but also to the private practitioner and the work in society at large. On the other hand, it is also important to remember that the involutional period must be considered as a transitional stage. Just as we have come to appreciate the importance of laying the foundations of prevention of adult personality disturbances by a better understanding of the problems of adolescence, so will we also have to consider the involutional stage as preparation for the type of adjustment which

will eventually be made in the pre-senium and senile periods. Recent studies (*11*) of maladjustments in old age including even such serious problems as senile psychoses have shown the great importance of adverse social and psychological factors shortly before and during the involutional period in preparing the ground for surrender to the inevitable deterioration of old age. The work toward the prevention of such predisposing factors will have to begin with a better understanding of the problems of the involution.

The approach to such an investigation must start out with the following questions:

1) What is the nature of the crisis in adjustment which must be faced at the involutional period?

2) What are the personality characteristics and life experiences which are especially liable to render a given person most vulnerable in such a crisis?

3) What are the social and personal factors which, at this stage of life and in view of the above considerations, are likely to enhance the difficulties in negotiating the crisis?

4) Is there any relationship between the type and relative seriousness of these factors and the outcome?

Few of the cases of Involutional Psychoses that come to our attention fail to furnish us with answers to some or all of the questions provided we analyze the data in relation to the cross section of the patient's life rather than restrict ourselves to any one single factor. To illustrate this point and before we present a detailed report of our results we should like to present briefly the following two cases:

CASE I

This patient was a 48-year-old man, surgical knitter by occupation who, when admitted to this hospital showed pronounced agitation, depression, somatic delusions and fears of impending death. The history is that of a native born American of English extraction with a negative family history and of average intelligence. He was married at 21, has 4 children and was well-adjusted maritally. He is described as quiet, hard-working, pleasant but over-conscientious and over-solicitous toward his children. His interests were almost exclusively centered in his family and in his work in which he took a great deal of pride. His trade was a highly skilled one and he was able to provide well for his family by his extreme efficiency. About four years ago, however, his work began to decrease. Machinery began to replace the hand workers, and he saw his occupation gradually slipping away from him. His income became so inadequate that his wife had to go to work to supplement and this upset him greatly. His older children had graduated from High School but were unable to find work and the economic condition of the family became strained. In the face of all this he began to develop feelings of inadequacy, hopelessness, fear of the future and a sense of "slipping." Concomitant with this there has been a gradual decrease of libido. The symptoms became increasingly more severe and finally led to his hospitalization. His progress in the hospital was satisfactory, he responded well to psychotherapeutic treatment, and at present is back in his home still showing some of his symptoms but considered as improved.

A number of factors stand out in this case as almost inevitably leading to the development of a severe sense of failure at this period of life. The personality characteristics—a lack of plasticity, restriction of interests, the exaggerated sense of responsibility and of his own importance in the scheme of things clashing with a realization of failure and displacement at a time of life when the sense of future security is most shaky find a logical expression in the symptom complex that is so characteristic of the Involutional Psychosis. A somewhat different set-up but essentially just as fraught with danger in the involutional period is found in the next case:

CASE 2

This patient was a 50-year-old, single woman, millworker by occupation, who, when admitted to the hospital was agitated, depressed, expressed delusions of sinfulness and a belief that she was the cause of prosecutions instituted by the government against her sister. The history is that of an Irish-American woman of average intelligence and with no history of mental disease in the family. She is unmarried and the only known instance of interest in the opposite sex is that at the age of 25 she "admired" an elderly man "at a distance." The personality is described as prudish, hypochondriacal, occasionally given to temper tantrums and rigid in her habits. Early in life she went to work at a mill and kept the same job for 36 years. She was devoted to her mother with whom she lived until the mother's death about nine years ago. This was followed by a feeling of loneliness and her sister who was a widow came to live with her. Two years before admission her menses ceased with a severe vaginal hemorrhage, and she actually expressed relief that the menopause had occurred. One year later the mill in which she had worked for so many years closed down and she lost her job. This also meant the loss of the one important interest in her life after the loss of her mother, as well as the fear of economic insecurity. She developed anorexia, weakness, excessive worry and insomnia. She was able to obtain another job in a new mill but gave it up in a very short time because of "weakness" and "fatigue." Another half-hearted attempt to adjust in a second job failed, and she went into a profound depression with agitation and the other symptoms which she showed upon admission. Attempts at treatment in the hospital were without success, and at present she is considered as worse than on admission.

Here, too, we find a combination of personality features and sociopsychological factors that logically culminate in the development of the disease. As contrasted with the first case we find here the absence of any real incentive for a readjustment, and a more malignant outcome. In both cases the climacterium, as such, seems to be of doubtful importance in the development of the disease. In the first case the decrease of libido seems more likely to have been one of the effects of the general sense of failure whereas in the second there is the story of adequate adjustment for a year following the menopause. In both of them, finally, neither the personality structure nor the previous history nor the clinical picture seems to be of a manic-depressive psychosis.

The present study was undertaken with the above considerations as a foundation. Factors of importance in the physical, particularly endocrinological occurrences in the climacterium were searched for but emphasis was also placed upon the type of personality, the background in terms of the life experiences of the individual patient and distressing circumstances in the way of social or psychological strain. The course of the process, the treatment administered and the outcome were studied in relation to these since it was our intention to gain insight not only into the factors which tend to produce this form of reaction but also their significance in conditioning a more or less severe type of reaction.

Material

All the cases admitted to the Worcester State hospital during the year beginning July 1, 1939 and ending June 30, 1940 and diagnosed Involutional Psychosis were included. Only those cases were used where the diagnosis represented the opinion of the majority of the staff physicians. In making the diagnosis the usually accepted concept was followed which may be defined in the following terms: Psychosis occurring in middle life and later years without evidence of organic intellectual defects, characterized mainly by depression, agitation, anxiety, feelings of

guilt and self-condemnation, occasionally showing paranoid trends of a depressive or punitive nature and hallucinations of a similar kind, and without a previous history of similar attacks.

Forty-seven patients were included in this group out of a total admission of 798 for the same period. Thirty-eight of these were women and 9 were men. Thirty-two were diagnosed as Melancholia, 9 as Paranoid and 6 as Other Types. The latter includes those in which doubts were present as to whether they actually belonged to this group and in the results we will refer to them as *doubtful*. The evaluation of the cases was made at staff conference at which one of the authors presided and personal knowledge of the cases was further secured by following their course in the hospital. The case records were studied for pertinent data concerning the life history, social settings and psychological dynamics. Similarly the clinical picture, kind of treatment and course during hospitalization were analyzed. During March and April of 1941 a follow-up study was undertaken to determine the present status and the intervening course. This was done by psychiatric examinations or social service visits to the home. In the discharged cases the estimate of present status took into consideration the statements of relatives, neighbors or employers in addition to personal interviews with the patient. According to the present status of the patients the material was divided into the following groups:

1) *Recovered:* patients living outside of the hospital, adjusting at the previous level and showing no indication of psychotic symptoms.

2) *Much Improved:* patients who showed a good social adjustment but where outsiders or the examining member of the staff felt that there was some question of the total disappearance of symptoms.

3) *Improved:* patients who showed definite amelioration of symptoms most of them adjusting outside although at a lower level, some still in the hospital mainly because no favorable outside placement was possible.

4) *Unimproved:* patients who have shown no appreciable change.

5) *Worse:* patients whose symptoms became more severe than on admission or who have shown signs of deterioration of personality. Only two of the cases died. One of them committed suicide and was included in group 5. The other improved, was sent out on visit and died some months later of a coronary thrombosis.

For purposes of reliable treatment of the data since the material is relatively small, we have tabulated it into three groups 1) Recovered and Much Improved; 2) Improved; 3) Unimproved and Worse.

It should be emphasized that the cases showed little variation in social strata since they came from a comparatively small district and were all state hospital patients. This was not the case, however, in levels of intelligence, nationality and occupation and some of these factors will be considered later.

Data and Results

These are presented in the following six charts. The first (Chart 1) deals with data of a general nature. Nineteen cases were found in the Recovered and Much Improved group; 15 in the Unimproved and Worse and 13 in the Improved. (For the sake of brevity we will refer in the future to these groups as "Rec. and M.I.," "Un. and W." and "Imp.") The majority of the cases were diagnosed Melancholia but there was a sprinkling of the Paranoid and Doubtful. It is interesting to note that only one of the doubtful cases occurs in the Rec. and M.I. group. As was to be expected the male cases are decidedly

in the minority and they have also shown a proportionately higher degree of Recoveries and Improvements and all of the men were diagnosed as Melancholias. The ages of the whole group range between 42–64. The average for the total is 53.43 years. The lowest average (51.3) is found in the Rec. and M.I. group. The highest (56.4) is in the prepsychotic level was estimated from the history. There are more of the normal or higher intelligence and it is interesting to note that they fall more often into the group of the Un. and W., while the dull normal or lower intelligences fall more frequently into the Rec. and M.I.

The physical build does not show

CHART 1

GENERAL

Outcome		Rec. & M.I.	Un. & W.	Imp.	Total
Number of Cases		19	15	13	47
Diagnosis:	Melancholia	14	10	8	32
	Paranoid	4	2	3	9
	Other Types (Includ. Doubtful)	1	3	2	6
Sex:	Male	4	1	4	9
	Female	15	14	9	38
Age:	Average	51.3	56.4	53.0	53.43
	Range	42–62	47–64	44–60	42–64
Nativity:	Native born	9	9	7	25
	Foreign born	10	6	6	22
Intelligence:	Normal and Above	7	9	10	26
	Dull and Below	12	6	3	21
Physique:	Mixed	9	8	6	23
	Pyknic	4	4	3	11
	Asthenic	2	1	1	4
	Dysplastic	1	2	1	4
	Athletic	3	0	2	5
Civil Status:	Married	14	6	7	27
	Single	3	3	4	10
	Divorced or Widowed	2	6	2	10
Children:	Present	15	9	6	30
	None	4	6	7	17

Un. and W. This is even more significant when we see that most of the Rec. and M.I. group were below the age of 53 whereas most of the Un. and W. were above that age. The native and foreign-born are practically equally divided in the group but there are slightly more foreign-born among the better results. The intelligence ratings were grouped into two divisions—those of normal intelligence and above and those of dull normal and below. In some cases intelligence tests were given, in others the anything of great significance. Fully half of the cases belong to the Mixed or Average type. Of the more specific body types the pykniks were found in about one-fifth of the cases and were equally distributed. Only 27 of all the cases were married at time of onset. The highest percentage of the unmarried were among the Un. and W. A fairly large percentage of the total is listed as having no children and we find that the absence of children is most frequent in the Un. and W.

In the second chart (Chart 2) we have tabulated a resume of the historical material in which, however, are not included the data concerning personality and etiological factors since these will be dealt with separately. The information concerning heredity is divided into three groups:

1) Cases that have no known mental diseases in the family history; these are *marked negative*.

2) Those in which only one known case of mental disease occurs.

3) Those in which there is more than one case.

It is interesting to note that cases that show one or more instances of mental disease in the family are most numerous in the Rec. and M.I. group. Also of interest is the information concerning the adult sex adjustment of the patients. Out of the whole group, 28 patients have shown a history of poor adjustment. Previous attacks of nervous disease were reported in relatively few of the cases—actually in 13. Since the diagnosis of Involutional Melancholia is made only in cases where a previous *similar* attack has not occurred, we thought it advisable to dilate on these previous attacks. In five of them the previous attacks occurred shortly before the present one and were so near to it that we are inclined to regard them simply as precursors of the present illness. In the others, they occurred long before but seem to have been mainly neurotic reactions to difficult situations. In none of the latter were there any similarities between the previous and present attacks. Particularly significant is the occurrence of operations or illnesses affecting the genito-urinary system or organs related to it (breast pa-

CHART 2

HISTORICAL

Outcome		Rec. & M.I.	Un. & W.	Imp.	Total
Number of Patients		19	15	13	47
Heredity:	Negative	8	9	7	24
	One case	5	0	1	6
	More than one	6	6	6	17
Adult Sex Adjust.:	Satisfactory	9	6	4	19
	Poor	10	9	9	28
Previous attacks of Personality Disturb.		5	3	5	13
Operations or Illness of G.U. or related system		8	9	9	26
Menopause:	1 yr. or over	5	9	3	17
	Concom.	9	4	6	19
	After onset	1			1
	With Phys. Sym.	11	4	3	18
	Without Phys. Sym.	4	9	6	19
Climact. (Male):	None	3	1	2	6
	Concom.	1		2	3
Onset:	Gradual	11	9	8	28
	Acute	8	6	5	19
Hospitalization:	Average Stay (mos.)	6	3	3.25	5
	Still in Hospital	2	8	5	15
Treatment:	Psychotherapy, etc.	12	12	9	33
	Metrazol	7	3	4	14

thology, low abdominal surgery, etc.). These occurred in 26 of the total cases and, as will be seen later, in most cases must be considered as of either precipitating or predisposing etiologic significance. The relationship of the sexual climacterium to the present process was studied with great care. In the case of the women, the menopause occurred in 17 of the cases from one to eight years prior to the onset of the present illness. It is interesting to note that more than half of these fall into the group of the Un. and W. and that, in all of them, there was a definite demarcation between the menopause and the present illness. In 19 of the cases the menopause was concomitant with the present symptoms and these were more numerous in the group of the Rec. and M.I. In one of the cases the menopause took place some time after the onset of the present illness. Physiological symptoms such as cold and hot flashes, dizziness, and other vasomotor symptoms were found in only one-half of the cases. It is significant that the cases with a good prognosis showed the occurrence of these symptoms most frequently and in the Un. and W. group the proportion was reversed. Only three of the nine men showed signs of the climacterium in such symptoms as decrease in libido and impotence. All of these were concomitant with the development of the psychotic process. The onset of the disease was most frequently gradual, usually with a prodromal stage with such symptoms as irritability, fatigability, headaches, difficulty in concentration, etc. There was no apparent relationship between the mode of onset and the outcome. Fifteen out of the whole group of 47 were still in the hospital at the end of the follow-up period but two of these were in the Much Improved group. Both of them have long been approved for visit, and could probably adjust outside if facilities were available.

The treatment could be divided into metrazol shock therapy and general psychiatric therapy consisting of psychotherapeutic interviews, occupational therapy, sedation, etc. In several of the cases endocrine therapy was tried in the form of Stilbesterol but as far as we could see, this was not in any way relevantly related to the outcome. The evaluation of metrazol versus general psychiatric treatment cannot be made since each type of treatment was used on a selective basis. Metrazol was not used in any cases where there were physical contraindications (particularly cardiovascular) whereas psychotherapy was used in those cases where psychogenic factors seemed to be of most importance. In several of the cases treated with Metrazol therapy, psychotherapeutic interviews were used as a supplement.

CHART 3

PERSONALITY

Outcome	Rec. & M.I.	Un. & W.	Imp.	Total
Number of Patients	19	15	13	47
Underactive	5	1	1	7
Introverted (Seclusive)	8	4	3	15
Anxious	3	0	0	3
Very religious	3	1	1	5
Shiftless	2		1	3
Autistic	2	0	0	2
Conscientious, pedantic	4	3	2	9
Prudish	3	2	2	7
Aggressive	1		2	3
Anaklitic	2	1	1	4
Frugal	1		2	3
Stubborn	2	2	1	5
Outgoing	6	6	3	15
Interest limited to work	1	2	4	7
Timid	4	6	2	12
Pleasant	4	3	3	10
Hypochondriacal	2	4	2	8
Sensitive	4	6	5	15

In Chart 3 we have tabulated the results of investigations concerning the premorbid personality. As can be seen from the chart, a series of descriptive terms frequently used in psychiatric personality studies were employed in

designating the various characteristics. One sees in the whole group a certain trend which is fairly closely related on the one hand to the clinical picture and on the other to the type of personality features described by such observers as Titley (*12*), Palmer and Sherman (*6*), Noyes (*5*) and others. As a general characteristic and, therefore, not specifically mentioned in the chart we find a certain rigidity of make-up and a pronounced tendency toward restriction of interests. Outside of these features, however, it cannot be said that any specific set of personality characteristics was found uniformly in all of them. However, certain personality "motifs" could be discerned as the material was broken down into groups. Thus we find such combinations as a) the hard-driving, aggressive, overconscientious and stubborn; b) the seclusive, autistic, underactive and prudish; c) the sensitive, timid and hypochondriacal, etc.

There are two types, the "outgoing" extrovert and the "pleasant," which seem to be out of place. However, as one scrutinizes the concomitant features in such persons, one finds, for instance, militant prohibitionism, pedantic sticking to details, chronic worry, hypochondriasis, conscientiousness, scrupulousness, etc., in conjunction with the extroversion. Similar characteristics were found also in the few cases described as "pleasant." In tabulating personality factors in relation to outcome, we have arranged them so that the characteristics occurring most frequently in those who have ultimately recovered or were much improved come at the top of the list while those that were more frequently found in the unimproved and worse were placed in the lower third. Thus we gain an indication as to the possible relationship between the premorbid personality and outcome.

In Charts 4 and 5 we have tabulated those occurrences which both to informants and physician seemed to be the most important predisposing and precipitating factors. Here, also as in the case of the personality features, we have tabulated those that occur most

CHART 4

PREDISPOSING FACTORS

Outcome	Rec. & M.I.	Un. & W.	Imp.	Total
Number of Patients	19	15	13	47
Pre-established Pattern	6	2	1	9
Incompatibility with Mate	8	4	4	16
Chronic Progressive Somatic Disease	2	1		3
Economic Stress	5	5	6	16
Exaggerated Feeling of Responsibility for Family	1		1	2
Nomadic Existence	1	1	3	5
Incompatibility of Person and Milieu	2	2	1	5
Lack of or Irregularity of Sex Adjustment	4	4	5	13
Social Isolation	3	6	2	11
No Children	2	3	4	9
Worry over, Friction with or Loss of Near Rel.	3	6	2	11
Surgery or Pathology of G.U. or Related Syst.		1	4	5
Exaggerated Attachment to Family		2	1	3
Loss or Threat of Loss of Occupation		2	1	3
Loss or Impending Loss of House	1	3		4
Absent	1	1		2

frequently in the Rec. and M.I. group on top and those occurring more frequently in the Un. and W. at the bottom. The charts speak for themselves in describing the types of social and psychological stress that seems to act as conditioning factor or precipitating agents in the development of the disease. The significance of those factors in their relation to the involutional process will be discussed later, in the comments. Their catastrophic nature can be well appreciated, particularly coming at the time when the individual faces the change from a productive period of life to a declining perhaps dependent one. One factor which might be emphasized is that, as we proceed from the upper to the lower parts of the chart, we find a gradual transition from situations which are potentially reversible toward those marked by finality

CHART 5

PRECIPITATING FACTORS

Outcome	Rec. & M.I.	Un. & W.	Imp.	Total
Number of Cases	19	15	13	47
Economic loss or stress	8	3	6	17
Worry over near relative	10	3	4	17
Undesired move	3	1	1	5
Loss of Social Outlet	2	1	1	4
Loss of occupation	1	1	3	5
Surgery or pathology of G.U. or related system	4	4	2	10
Death of near relative	2	8	4	14
Signs of ageing	1	2	1	4
Physical debility		2	3	5
Move from or loss of house	1	4	2	7
Absent	1	2		3

and inevitability such as the loss of near relatives, absence of children, physical debility and loss of home or of occupation.

In the last chart (Chart 6) we have tabulated the most prominent symptoms, mental and physical, that were found in these cases. As can be seen from the chart and as would be expected from the diagnosis, the symptoms that occur most frequently are those of agitation, depression, retardation and

CHART 6

SYMPTOMS

Outcome	Rec. & M.I.	Un. & W.	Imp.	Total
Number of Cases	19	15	13	47
Mental:				
Depression	17	11	9	37
Retardation	8	4	5	17
Anxiety	10	3	5	18
Hypochondriasis	5	4	5	14
Guilt and Punishment	7	7	2	16
Agitation	10	9	5	24
Somatic Delusions	5	4	5	14
Hallucinations	4	5	4	13
Withdrawal	2	4	2	8
Paranoid Delusions	6	10	6	22
Association Disturbance	1	3	0	4
Apathy		3	1	4
Confusion		5	1	6
Somatic:				
Cardio-Vascular	14	9	10	33
Neurologic	4	3	1	8
G.U.	6	1	3	10
G.I.	1	2	1	4
Endocr.	2	1	3	6
Absent		4		4

ideas of guilt and punishment. Paranoid delusions, hallucinations, withdrawal and confusion, however, occur fairly frequently but appeared to be definitely related to a depressed and anxious affect and feelings of sinfulness. Thus, the delusions, if not actually self-accusatory and apprehensive, dealt with ideas of danger and expectation of wrong doing either against the patient or his family. Furthermore, we would emphasize that the more schizophrenic-like symptoms such as apathy, association disturbances, withdrawal and hallucinations as well as the paranoid delusions occur most often in the cases who did not improve or who became worse, regardless of the particular sub-type diagnosed. Serious somatic disease was present in very few of the

cases, although mild or moderate somatic pathology was found in many of them, the most frequent being cardiovascular involvements. These included mild arteriosclerosis, some cardiac pathology, hypertension, etc. Evidence of endocrine disturbance other than the climacterium occurred in only a very few cases. They included thyroid involvement, hirsutism in women, etc. Only four of the cases showed no signs of somatic pathology and singularly enough, all of these were in the Un. and W. group.

Before we go on to an evaluation of some of the above data and for the purpose of illustrating the close relationship and interdependence of personality makeup, life history and precipitating factors in the determination of the occurrence and course of the Involutional Psychoses, we wish to present brief summaries of a few representative cases:

CASE 3

This patient was a 59-year-old married woman who, when admitted to the hospital, showed marked depression, agitation and fear of death. The history is that of a person of limited intelligence, born in Armenia of a peasant background. There was one case of mental disease in the family. She married at 19 and has three children. The marital adjustment is said to be adequate. Her personality was described as dull, careless, with few interests aside from the family and immediate personal and economic needs. She emigrated to this country seven years ago whereupon her outside interests became even more restricted because of language difficulties and the change from rural to urban tenement environment. Shortly after arrival she began to complain of abdominal pains which finally led to a diagnosis of gall bladder disease and one year ago a cholecystectomy was done. Shortly afterwards a postoperative hernia developed and the patient reacted to this with an exaggerated degree of worry, fear and preoccupation. As the hernia became more marked, the mental symptoms increased, and she expressed fears of "blowing up," could not attend to her work, lost interest in the family and personal needs and finally developed the symptoms which brought her to the hospital. Her menses ceased a number of years before without any apparent mental or physical symptoms. In the hospital treatment consisted mainly of repair of the hernia and reassurance about her health. She improved rapidly, lost all of her symptoms, returned home and is adjusting at present on the prepsychotic level.

We would stress here the simple, monotonous, rigid type of personality, limited in assets and interests, the colorless background and social isolation exaggerated since her emigration to a new environment and the catastrophic significance of the postoperative complication occurring at a critical period of life. The clinical picture was typical of the Involutional Melancholia and the apparent reactive nature of the episode only emphasizes the importance of determining factors of this kind in precipitating the disease at this period in a person who has never shown this kind of reaction before.

CASE 4

This patient was a 54-year-old, single woman who, on admission showed agitation, depression, inaccessibility, confusion and expressed paranoid delusions of a depressive nature concerning her family. The history is that of a French Canadian woman of dull normal intelligence and no history of mental disease in the family. The personality is described as timid, seclusive, pious, prudish. She worked as a weaver in a mill from early childhood and sustained some breast injuries at her work. A bilateral mastectomy was performed twelve years ago and she stopped work on a physician's advice. Her menses ceased abruptly after the operation without any apparent symptoms. She never married and lived with her mother until her death four years ago. Her interests were mainly restricted to

her family, especially her mother, and to her religion. Directly after the death of her mother she began to show the early signs of the present disease. She withdrew altogether from outside activities, stopped going to church, lost interest in her personal appearance, became depressed and complained of somatic ailments. Several months before admission her brother and sister died within a short time of cancer, and the present picture developed. Treatment in the hospital led at first to a mild improvement but she relapsed and is now considered as worse than on admission.

Here, too, we see a distinct interplay between a personality devoid of resilience and assets and a catastrophic occurrence at the involutional period. In this case, however, the depressing circumstances were of an irreversible nature with nothing left for the patient to return to and the course proved itself a more severe one.

CASE 5

This patient was a 62-year-old married man, vice-president of his labor union, who, on admission, presented a picture of pronounced depression, underactivity, ideas of guilt and inadequacy and a hopeless outlook for the future. He is a man of high intelligence, the self-made, aggressive, driving type who worked his way up from a skilled worker to a union official. There is no history of mental disease in the family but several cases of rheumatoid arthritis from which the patient himself has suffered for about 20 years. His personality is described as very conscientious, serious-minded, aggressive, rigid and stubborn. All of his outside interests were centered in his work and his family for whom he had an exaggerated sense of responsibility. He married at 28, had 4 children and his marital adjustment was good. About two years before admission, his arthritis necessitated a hip fixation. He was told that this would require his being away from his work for six months so he made his arrangements on that basis—both financially and for someone to attend to his union duties. Complications, however, kept him invalid for more than a year and he became increasingly tense and worried. At the end of the six months he refused to take his salary any longer and this meant a severe drain on his finances. He developed a severe anorexia, became depressed and was in several hospitals before admission here. Treatment in this hospital consisted in psychotherapy and treatment for the arthritis and other somatic symptoms. After a seven-month hospitalization he improved both mentally and physically and was able to leave the hospital much improved.

Here we have an essentially different type of personality with many assets and good previous adjustment but also with a different type of social setting. He is apparently a person of set characteristics and interests who could function well only in the setting which he had fixed for himself, and when this was threatened he saw no solution to the problem and surrendered to a feeling of despair.

Discussion

I. The Relationship of the Involutional Psychoses to the Manic-Depressive Group and to the Climacterium

In keeping with the conclusions reached by some of the authors quoted above, our material shows that whatever similarities the Involutional Psychoses may have with other processes and particularly with the manic-depressive, essentially they demand a distinct place of their own. In the first place, we find a different symptom complex even though individual symptoms may coincide at times with those found in other psychoses. Secondly, we miss the occurrence of previous similar attacks. This is significant since it emphasizes the important rôle played by the involution as such, in the breakdown. Equally important is the type of premorbid personality since it is not only definitely different from that usually

seen in the manic-depressive but is, as will be pointed out later, peculiarly unadaptable to the special problem of the involutional crisis. Lacking, also are the vacillations in mood and the readiness to shift from one goal to another as changes occur in the outside. We find rigidity as contrasted to plasticity, restriction as contrasted to spreading out of interests. Less significant but pointing in the same direction is the comparatively small number of the pyknic physical build.

A similar trend can be seen with regard to the contention that these psychoses are simply expressions of the climacterium. It is true that the signs of cessation of sexual productivity must be taken as an important psychological factor, but this does not mean that the psychosis develops as a result purely of the physiological changes. Aside from the inefficacy of treatment by gonadotropic preparations, we find, on the one hand, very few indications of actual endocrine disturbances in most of our cases and, on the other, in so many of them, especially in the more severe ones, there seems to be an actual lack of time relationship between the climacterium and the onset of the psychosis. The apparently beneficial effects of some of these drugs as reported in some instances may be partly explained by the fact that most of the patients who were going through the menopause in conjunction with the onset of the psychosis had a good prognosis. It is well known that gonadotropic agents successfully influence the physiological symptoms of the menopause and since these cases seem to show a tendency for improvement anyway, they are quite likely to lead one to the erroneous conclusion that because both sets of symptoms show amelioration and one of them is known to be influenced by the drug, the other also must have been similarly influenced.

2. THE DETERMINANTS AND MANNER OF DEVELOPMENT OF THE INVOLUTIONAL PSYCHOSES

In the evaluation of our data in regard to this aspect we must take into consideration two factors, which, even though commonly known are not always sufficiently stressed. The first of these is that the process of involution, as a transition period from productive adulthood to the senium with all its implications, involves practically every aspect of the psychobiological organization, chemistry as well as attitudes, physical appearance as well as social relationships, work as well as methods of recreation. This introduces, of course, a complexity of possible etiologic relationships. Secondly, it must be remembered that as in most personality disturbances, we cannot expect to find any single factor which, in itself, can be regarded as the only or even the most important causative one. Usually we find such disturbances to be the resultant of a number of factors which, in their interrelationships, find a point of convergence at a given time and lead to the maladjustment. We should not be surprised, therefore, to find a multiplicity and variation of determinants although in each case they follow a general pattern logically related to the involution.

With this in mind we should like to discuss some of the factors that appear to be most significant. The high incidence of women might be related to the relatively more abrupt and distinct cessation of sexual productivity. This, at least, is a logical inference. Equally important, however, is the fact that women, at least of the milieu and type from which our patients were drawn, are more likely to restrict their interests to the narrow confines of the family. Domestic and family affairs thus mean more to them than to the men. Highly significant is the comparatively large

number of poor adult sex adjustments; high incidence of single, divorced or widowed persons and frequently occurring childlessness. All of these factors become especially significant at the involutional period when the chances of new ventures and further productivity are at a minimum, and where the security of a stable family life is vastly more important than earlier in life. The decidedly high incidence of operations or severe illnesses of the genito-urinary and related systems occurring shortly before the onset presents a number of possible leads. It represents an attack on the very systems that are traditionally accepted as the first to suffer from the deterioration of old age. Added to this is the effect on the well-known preoccupation with somatic, particularly pelvic and abdominal organs so characteristic of the involutional period. Finally, we might speculate on the meaning of an attack of this type in relation to narcissistic trends that have been frequently pointed out as important in this disease.

An analysis of the individual cases in our group supports the conclusion of Palmer and Sherman (*6*) that the structure of the premorbid personality is of greater importance in the development of these psychoses than any of the other factors. In our estimation, however, one must take into equal consideration earlier experiences (predisposing factors) and the critical events occurring at the time of onset (precipitating factors). Furthermore, it is not a matter of a given set of uniformly occurring personality characteristics that always determines the psychosis but rather certain personality patterns which are characterized by a lack of plasticity and restriction of interests and when they are faced with certain types of social and psychological settings of a catastrophic nature lead to a failure in the readjustment demanded in the involutional period. This interaction of vulnerable personality and conditioning factors is clearly seen in some of its possible variations in the cases quoted and could be found in the bulk of our material. Thus, the timid, anaklitic, hypochondriacal person may not be much affected by social or economic crises but will break down when he loses a person to whom he has formed a deep attachment and on whom he depends for a feeling of security. On the other hand, the strong, over-conscientious, hard-driving individual who has vested all his interests in a business or professional career will be thrown off balance when something threatens or actually destroys this particular object of his interest.

In the group of predisposing factors we find such features as the development of unusually strong attachments, social isolation, incompatibility and frustration in married life, chronic progressive, incapacitating diseases, preestablished patterns in the form of familial diseases and others, all of which set the stage for the reaction of the involution.

The precipitating factors mainly take the form of fairly acute catastrophic occurrences such as loss of objects of attachment, threatened security, loss of occupation, movement from long-occupied homes or localities and sudden illnesses or operations. It must also be kept in mind that, on the one hand, the effects of these combinations need not be as serious in some individuals as in others. Given qualitatively similar settings but such that differ in intensity we may find that some persons may not react visibly to the situation at all—hence the large number of persons who do not develop Involutional Psychoses but go through emotional turmoils with minor neurotic manifestations, some temporary disorganization but finally reach more or less acceptable adjust-

ments. It is only in the very few, of course, that specific personality vulnerability combines with especially distressing circumstances to produce serious psychotic maladjustments. On the other hand, it is conceivable that, in some of the cases, the operative factors may be so deeply hidden under the surface as to escape our observation or even that of the patient himself and an apparently trivial occurrence may set off a reaction more serious than one would expect.

3. PROGNOSTIC INDICATORS

As regards the possibility of establishing criteria of prognosis some rather significant features can be abstracted from our data. We see that the age factor is of importance. Although the average age of our whole group is between 53 and 54 years, we find that the average for our Rec. and M.I. group is 51.3 and that of the Un. and W. is 56.4. The trend suggested by this factor runs through most of the points of prognostic differentiation in our results. The younger the person, the less likely the inevitability of resignation to old age. This is particularly well-seen in relation to the data presented under predisposing and precipitating factors. In the latter we find that such occurrences as economic stress and worry over near relatives occurs much more frequently in the Rec. and M.I. group whereas death of near relatives, signs of ageing and move from or loss of house occurs more frequently in the Un. and W. group. Economic stress can be remedied, worry over children or other relatives may prove unfounded or exaggerated but the death of a loved one or the loss of a house to which one is attached has the stamp of inevitability. It must be remarked here, in reference to the establishment of criteria of this kind, that we have arranged our data in such a way that comparisons and contrasts are made primarily on the bases of the Recovered and Much Improved cases on the one hand, and the Unimproved and Worse cases on the other. This was done first of all because these are the two larger groups and so admit of more adequate statistical comparison than if there were a greater discrepancy in numbers. More important, however, was the consideration of the reliability of the outcome. The Improved cases are a conglomerate group presenting a variety of gradations—some nearer to the Much Improved, some nearer the lower extreme. Furthermore, in this group purely technical factors such as chances for adjustment outside, etc., were quite likely to cause a vacillation from one extreme to the other. In the other two groups the issues were much more clear-cut and the course of the actual psychotic manifestations more easily discernible.

Other factors which should be mentioned as more or less significant for prognosis are the following:

1) In the Rec. and M.I. group there is a higher proportion of intelligence ratings at the dull normal level or below than those of the higher rating. This proportion is reversed in the Un. and W. We could speculate on various possible explanations. Is it, perhaps, that for a simpler person it takes a less severe set of circumstances to throw him off balance and hence it is easier to readjust him? Or does the person with the higher intelligence develop stronger fixations in his work or social setting and therefore feels the loss of it more than the other? Or, finally, is it possible that in the more complicated organization, the mechanisms, too, are more complicated and less likely to be understood and therefore more difficult to readjust?

2) Another feature which is striking but not logically understandable is the definite preponderance of cases where

the climacterium occurs concomitantly with the psychosis and when this is accompanied by physiological manifestations the prognosis is better. It is difficult to see the reason for this relationship but it certainly does not argue for a direct relation, either qualitative or chronological, between the severity of the menopause and the symptoms of the Involutional Psychoses. It may be that we are dealing, in these cases, with an actual endocrine unbalance which, after it reaches a homeostatic equilibrium, removes part of the load and permits, therefore, of a more satisfactory readjustment.

3) Of the personality factors, we find that the underactive, introverted and anxious are more frequently associated with a good prognosis, whereas the timid hypochondriacal and sensitive seem to be more frequent in the group with a poor prognosis. Here again we must emphasize that a proper evaluation can only be made on the basis of the interrelationships of the personality characteristics and the situations which the patient has to meet.

The clinical picture also shows some points of prognostic evaluation. Here we find that depression, retardation and anxiety are generally to be found in the cases that improve whereas symptoms which represent disturbances of a deeper stratum such as paranoid projections, association disturbances, apathy and confusion are more commonly found among those with a poorer prognosis. It must be added, however, that these features were particularly frequent in the cases we have designated as doubtful and the question might very well be raised as to whether some of them may not be more nearly related to the so-called late Schizophrenias.

It is to be emphasized that further studies are indicated as supplements to the present investigation. In the first place it would be desirable to study a group of persons in the involutional period who have not developed psychotic reactions. The difficulties in obtaining an adequate sampling of such material are obvious. Secondly, a longer period of follow up would be advisable, although the material studied by Palmer and Sherman (*6*) for a period of 5 years, showed essentially similar results in certain respects. Finally studies should be undertaken on a group of Involutional Psychoses coming from social and economic strata different from our material.

Conclusions

1) The Involutional Psychoses are to be regarded as a distinct reaction type representing a failure in adjustment to the problems specific to that stage of life. In this sense they should be considered as essentially different from other psychoses including the Manic-Depressive group.

The climacterium represents a very important aspect of the total involutional picture and as such frequently plays an essential etiologic rôle in the development of these psychoses. It is incorrect, however, to consider these diseases as entirely due to the physiological changes introduced by the climacterium.

2) The development of the psychoses depends upon a variety of factors which tend to render an adjustment to the involution more difficult. Chief among these are:

a) Special types of personality organization lacking in plasticity and restricted in interests.

b) Conditioning experiences which enhance these weaknesses.

c) Precipitating factors in the form of catastrophic occurrences which threaten the sense of security or the continued possession of objects of strong attachment.

3) The following factors were found

to be of importance in the consideration of criteria of prognosis: Age, intellectual level, adequacy of adult sexual and family adjustment, the time relationship between the menopause and the onset of psychosis and the occurrence of physiological menopausal symptoms. Of particular importance in this regard were the type and intensity of certain personality characteristics, the degree of relationship of some of the predisposing factors to these personality traits, the degree of reversibility of the precipitating factors and the type of symptoms controlling the clinical picture.

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THE MEASUREMENT OF INDIVIDUAL DIFFERENCES IN AUTONOMIC BALANCE

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IN A RECENT PAPER Thurstone (*4*) stressed the value of factor analysis in borderline research where one frequently cannot see the woods for the trees. Put more concretely, the experimenter in certain types of research frequently becomes lost in his discrete data and needs techniques whereby he may gain perspective of the data as a whole. This seems to be true especially in physiological psychology, since most of the relationships which have been reported in the past, both between physiological variables and between physiological and psychological variables, have been low. Few have been of sufficient magnitude to stand out and direct attention to a whole area of relationship, or to lend much credence to suspected areas of relationship.

This condition seems to have obtained in work with functions mediated by the autonomic nervous system. Although an hypothesis of general relationship has been with us since the 1910 publication of Eppinger and Hess (*2*), and although certain cases such as Hirschsprung's and Raynaud's diseases stand out on the horizon as being benefited by reduced innervation of the thoraco-lumbar system, most research concerned with general relationships in the field has been little more than suggestive. Certain workers, with their attention directed to the *apparent lack of relationship* in general tend to deprecate the Eppinger and Hess concepts of vagotonia and sympathicotonia. Others, with their attention directed to the *apparent relationships* in extreme cases, believe that there is much in the theory. In a recent report (*5*) it was contended that the theory had never been adequately tested.

Let us restate the hypothesis in terms of contemporary knowledge. It is believed that:

A) The differential chemical reactivity and the physiological antagonism of the adrenergic and cholinergic branches of the autonomic nervous system permit of a situation in which the action of one branch may predominate over that of the other. This predominance, or autonomic imbalance, may be phasic or chronic, and may obtain for either the adrenergic or the cholinergic system.

B) Autonomic imbalance, when measured in an unselected population, will be distributed continuously about a central tendency which shall be defined as autonomic balance.

It should be noted that nothing has been said about the "tonus" of the adrenergic or cholinergic systems, and that, following Dale (*1*), the chemical rather than the anatomical differentiation of autonomic nerves has been employed. For most practical purposes the terms "adrenergic" and "sympathetic," or "cholinergic" and "parasympathetic," may be considered as synonymous.

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It is well known that at least phasic predominance of the adrenergic system is a common occurrence in situations involving stress. The heart rate and blood pressure increase, salivation decreases, and the individual may perspire and grow pale. The reasoning is, then, that if relatively chronic conditions of imbalance do exist, measurements of autonomic functions for individuals of an unselected population in comparable physiological states should show similar relationships to those found in states of phasic imbalance. Positive intercorrelations should be obtainable when the functions have been reflected in their appropriate directions. A sparcity of salivation should be associated with a fast heart rate, a high blood pressure, a high degree of vasoconstriction and perspiration. A copious salivary flow should be associated with a slow heart rate, a low blood pressure, a dry skin and relative vasodilatation. Insofar as such positive intercorrelation is found to obtain, the first part of the hypothesis may be regarded as substantiated. Insofar as differences in autonomic functions may be attributed to the entire group instead of to a few extreme cases, the second portion of the hypothesis may be regarded as substantiated. In order to test the hypothesis, then, there are needed measures of a number of autonomic functions taken during a resting state on individuals of an unselected population.

In selecting the tests it has been necessary to consider the long-time character of our study and the necessity for maintaining the cooperation of both children and parents. Drug tests were eliminated from consideration. After preliminary work the following tests were selected to be utilized first: heart rate and sinus arrhythmia, recorded electrically; salivary output for a five-minute period and per cent of solids in saliva; palmar and non-palmar sweating as measured in terms of electrical conductance of the skin; respiration rate; reclining systolic blood pressure and the difference between standing and reclining pressures; and the latency and persistence of red dermographia as elicited by the "permographometer" of Patek and Weiss (*3*). This is merely a simple instrument for scratching the skin with a known and constant pressure. Stimulation was applied over the biceps of the right arm.

These twelve and eight other tests were given to 62 elementary school children, ranging in age from 6 to 11 years, during January to March of 1940. All tests were made in the mornings between 9:30 and 12:00, and the salivary samples were taken between 10:30 and 12:00. The measures of heart, respiration, skin conductance, blood pressure and dermographia were presented under conditions of controlled temperature and humidity, and were recorded with subjects reclining unless otherwise described. Both boys and girls were included in the group since no significant sex differences in these functions were found at this age for these 62 children.

These tests have been described in greater detail in a report (*5*) dealing with their intercorrelation and their factor analysis. The influence of chronological age was corrected for by the technique of partial correlation. As was shown there, the majority of the functions supposedly influenced by the autonomic nervous system were found to have low but positive intercorrelations. Their nature was such, however, that they might be attributed to chance variation. It was argued that if a true factor does exist among these functions it should be discernible by means of factorial analysis. Thurstone's multiple factor method was applied to the data, and three rotated solutions with two,

three, and five factors, were presented. Evidence was presented for the conclusion that the two-factor solution afforded the most valid description of the data. A judgment of the validity of that decision must, of course, await other similar analyses.

This two-factor solution is reproduced in Table I. An x following the test number signifies that the measure has been reflected. Factor Nu was tentatively defined from the nature of the tests most highly correlated with it, as an autonomic factor, and factor Mu has been called "relaxability"—that is, the capacity which individuals possess in varying degree to relax the skeletal musculature upon sitting or reclining. Only the autonomic factor will be discussed in this paper. The muscular factor will be treated elsewhere (*6*).

Factor Nu is seen to be defined chiefly by 25x (sparcity of saliva), 26 (high percentage of solids in saliva), 28x (fast heart rate), 29x (little sinus arrhythmia), 37-38-39 (much palmar and non-palmar sweating), 43 (high basal metabolic rate), and 80x (low pulse pressure). Variable 23x (dermographia persistence), which probably is a measure of relative vasoconstriction, is low in relationship but in the expected direction. The only exception to this picture of autonomic communality is measure 76 (systolic blood pressure), which has a negative relationship. In spite of this one exception, it is difficult to conceive of any factor but the autonomic nervous system which could account for this pattern of interrelationship.

Insofar then as factor Nu is a valid autonomic factor, the first portion (A) of the hypothesis may be regarded as substantiated as it applies to these supposedly normal children.

The next step in the analysis was to measure the amount of autonomic imbalance manifested by each individual. The most simple technique probably would be to select those tests which seem to be the best and to score 1 point for each measure for each individual who deviated more than an arbitrary amount (say $1/2\sigma$) from the mean of the group. All deviations in one direction from the mean could be scored as plus, and all in the other direction could be scored as minus. A more refined measure would be to translate the raw scores into standard score form in terms of their means and standard deviations, and utilize the average of these standard scores for the measures selected. A still more refined measure would be to estimate the amount of the "autonomic factor" represented in each individual subject. This may be done by the technique of multiple correlation by means of which the various tests are weighted in proportion to the relationship of each to the factor to be measured. All three methods have been tried, using a battery of seven tests.

Although more or all of the tests

TABLE I

TWO-FACTOR SOLUTION FOR TWENTY PHYSIOLOGICAL MEASURES OF 62 SCHOOL-AGE CHILDREN, 1940 WINTER DATA

No.	Measures	Nu	Mu
22x	Short Dermographia Latency	−.06	.31
23x	Short Dermographia Persistence	.20	−.28
25x	Low Salivary Output	.56	.05
26	% Solids in Saliva	.52	.17
28x	Short Heart Period	.42	.62
29x	Little Sinus Arrhythmia	.46	.51
32	Reaction Time	.02	.31
33	Change in Palmar Log Conductance	−.07	.74
34	Muscular Relaxation	.02	.18
35x	Little Restlessness (rating)	.02	.21
37	Standing Palmar Conductance	.48	−.03
38	Reclining Palmar Conductance	.50	−.42
39	Non-Palmar Conductance	.30	−.08
43	Basal Metabolic Rate	.36	.17
45x	Small Sigma Respiration Amplitude	−.07	.19
58	Respiration Rate	.07	.30
75	Change in Systolic Blood Pressure	−.11	.06
76	Systolic Blood Pressure	−.29	.26
77	Diastolic Blood Pressure	.19	.50
80x	Low Pulse Pressure	.35	.23

might have been used for this purpose it was deemed desirable to eliminate one of any two tests which showed high intercorrelation in order to insure that specific anomalies of function in a given individual would not receive undue weight. Thus, only one of the blood pressure measurements was used, and only one of the two heart measures, and only one of the two salivary and one of the two palmar skin conductance measures. The other criteria for selecting tests for this work were ease and reliability of data collection. Basal metabolic rate was eliminated because it was not determined when the same subjects were retested during the summer months, and a comparative analysis of the data was desired. This left seven tests representing very diverse functions: dermographia persistence, salivary output, heart rate, palmar sweating non-palmar sweating, respiration rate, and pulse pressure. Although palmar and non-palmar skin conductance are measured in the same manner, the first is associated with emotional (or at least muscular) mechanisms and the second with heat regulatory mechanisms.

Multiple correlation by the Doolittle method resulted in the following regression equation which is in standard score form.

$$Nu = .15z_{23x} + .39z_{25x} + .31z_{28x} + .38z_{37} + .10z_{39} - .10z_{58} + .22z_{80x}$$

It may be read as follows: The estimated score for the autonomic factor for a given individual equals .15 times his standard (z) score for dermographia persistence plus .39 times his standard score for salivary output, plus etc.

Since four of the seven variables in the equation require reflection, the entire equation was reflected. By means of this transformation only three variables require reflection, and high scores for *Nu* indicate deviation toward the parasympathetic end of the scale (*i.e.* copious salivary flow, little palmar perspiration, etc) while low scores for *Nu* represent deviation toward the sympathetic end of the scale. The theoretical mean, when standard scores with a mean of 50 and a σ of 10 are employed, is obtained by substituting 50 for each z in the equation. The result is 72.5.

Two groups of data were then compared for these seven tests by the three methods of scoring. Fifty-three of the same children had been retested in the summer approximately six months later. The picture of intercorrelations for these data seemed quite different from that for the winter until it was discovered that eight cases, who were measured under extreme temperature conditions, were causing this apparent change. This was notably true for the skin conductance measures. When these variables were plotted against temperature, S-shaped curves were found with the center of the distribution practically flat and four cases at each end contributing the upward and downward portions of the curves. When these eight cases were eliminated the intercorrelations among the tests became essentially similar to those for the winter data.

Correlations between winter and summer scores for the remaining 45 cases showed coefficients of .39 for the most simple method of scoring. When the mean standard score was employed the correlation rose to .43; and when the regression equation derived from the winter data was used, the correlation jumped ten points to .53. It may be concluded that this seven test battery measures a factor which tends to remain relatively stable over a six-month period in these children, and that the regression equation derived from the factor analysis furnishes the most reliable method of measurement of this factor.

The frequency distributions for these

regression estimates, which have been termed measures of autonomic balance, show no discrete types. Instead, as may be seen in Figure 1, the distributions for both summer and winter data are continuous, though slightly skewed toward the sympathetic end of the scale. The standard scores also were corrected for age. With individual scores of autonomic balance at hand it becomes possible to check the adequacy of the correction for age, and the effect of the joint analysis of physiological data from both sexes. The 62 scores for the winter data

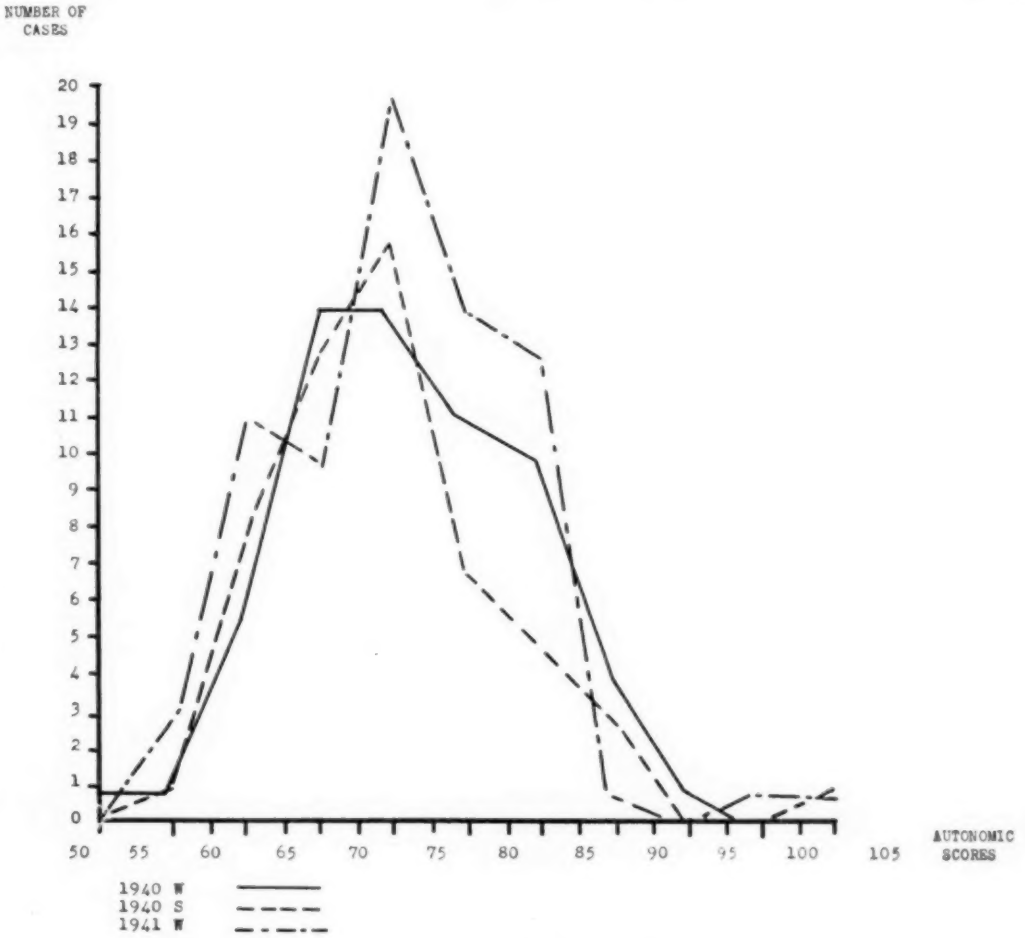

FIG. 1. Frequency distribution of autonomic scores for three groups of data.

second portion (B) of the original hypothesis may be regarded as substantiated therefore, for this factor and this population.

It will be recalled that both boys and girls were included in the analysis since no significant sex differences were found in the data; and that the influence of chronological age was partialled out of the original correlational matrix. The have been correlated, therefore, with age and sex. The relationship to age is .09. Evidently the correction of the data was adequate. The approximate correlation with sex, however, when each girl is assigned a value of 1, and each boy a value of 2, is .26. The mean score for the girls is 70.2 and that for the boys is 74.6. The critical ratio of this difference is 2.15, a value which

may or may not be significant. If it is significant, either girls tend to be more adrenergic than boys, or the final results show a cumulative effect of sex differences which might be corrected for.

The next step in the analysis was to apply the regression equation to other data available for these same children. All possible of them had been retested during the winter of 1941. In addition, four of these seven measures were made on the same group during the summer of 1939. Four sets of data are available for forty-eight children. The intercorrelations of each possible pair of derived autonomic scores are shown in Table II. It will be noted that the addition of three cases has raised the correlation between the 1940 winter and summer data from .53 as previously cited, to .57.

TABLE II

RELATIONSHIPS BETWEEN FOUR SERIAL MEASURES OF AUTONOMIC BALANCE FOR 48 CHILDREN 6 TO 12 YEARS OF AGE

	1939S	1940W	1940S	1941W
1939S				
1940W	.56			
1940S	.42	.57		
1941W	.52	.69	.64	
Mean	72.2	72.6	72.5	72.7
S.D.	5.5	8.4	7.9	9.5
Range	86–62	94–54	101–57	102–58

It will be seen that the data show a considerable degree of consistency over periods of six months and a year. In short, the test battery appears to measure a composite function which differs in individuals but tends to remain constant in a given individual. The lower relationships with the 1939 data are to be expected since only 4 of the 7 tests were then in use. The closer relationship between the two sets of winter data was expected also in view of the fact that some of these functions have been found to be altered during the summer months. These seasonal variations are to be reported elsewhere (7).

The following tables show longitudinal measures of selected children. In Table III are shown six cases who have changed only a few points in score over a year's time. All data are in standard score form, with an arbitrary mean of 50 and standard deviation of 10. For the most valid picture, only the more reliable measures, the last three, should be regarded.

TABLE III

SOME CASES MANIFESTING ESSENTIAL STABILITY OF AUTONOMIC SCORES

Case	1939S	1940W	1940S	1941W
40m	53	60	62	59
87m	35	41	41	38
98m	33	41	41	39
19f	51	37	38	40
59f	31	45	42	44
67f	53	60	65	61

Table IV shows the results for three cases of identical multiple births. The first, a case of identical triplets, shows two of the boys to be markedly similar and the other to be different to the extent of approximately one standard deviation. The next case, girls who look and act almost identical, are seen to vary somewhat in most of their scores. The third case, twin boys, are seen to be similar for the first two measures, after which one of the two has a decreasing score.

TABLE IV

AUTONOMIC SCORES FOR THREE CASES OF IDENTICAL MULTIPLE BIRTH

Case	1939S	1940W	1940S	1941W
45m		49		49
46m		49		46
47m		59		59
41f	64	58	57	62
42f	53	47	51	47
100m	49	49	43	35
101m	53	47	51	47

Table V shows some cases with

trends in score. In at least one of these cases, 85m, we know that there has been a great improvement in the home environment over the past year. The upward trend of 105f, who has been one of our most apprehensive subjects for

TABLE V

SOME CASES SHOWING TRENDS IN AUTONOMIC SCORE

Case	1939S	1940W	1940S	1941W
20m	60	58	52	49
71m	55	51	39	39
81m	75	59	57	56
23m	50	67	86	81
85m	35	28	48	53
72f	56	36	41	48
105f	68	71	72	75

these measurements, probably represents something of a practice effect. This may be true also of 72f but is certainly not the explanation for the increase in score of 23 m, a boy who is very well known to the experimenter.

Table VI shows cases who manifest seasonal variation in score, a factor which probably accounts for the greater stability of the winter to winter scores. This change is evidently dependent upon external temperature and humidity, for these factors were controlled in

TABLE VI

SOME CASES SHOWING SEASONAL VARIATIONS IN AUTONOMIC SCORES

Case	1939S	1940W	1940S	1941W
64m	67	76	68	78
102m	47	61	53	55
49m	51	35	65	38
66f	45	31	49	35
76f	71	64	67	60
91f	51	46	61	48

the measuring room. It should be noted that some cases show higher scores in summer while others show their highest scores in winter.

It is of interest that only three of these forty-eight children show a marked variability in scores which cannot be classified as a trend or a seasonal variation. These three cases are reproduced in the following tabulation.

Case	1939S	1940W	1940S	1941W
1f	38	53	53	45
33m	64	53	39	60
55m	64	51	51	60

In conclusion, it would seem from the data at hand that this weighted test battery makes possible the measurement of a variable in children in which the majority of them show considerable stability over a year's time. Certain of the fluctuations may be attributed to seasonal variations which may or may not be a constant for a given subject. Other of the variations are in the form of trends which may be related to changes in the external environment.

The essential stability of most of the scores and the data for the cases of identical multiple birth suggest that we are dealing with a constitutional factor, which of course is not held to be unmodifiable. It indicates as well that this battery of seven tests is fairly reliable, at least when used during the winter months. The need of more tests in the battery is self-evident. In addition to work in this direction, studies are being made to discover to what overt behavior and environmental factors these autonomic scores are related. Although it is too early for definite conclusions, evidence from small samples of unselected cases suggests that those children with high scores are less emotional, more controlled in behavior, and more shy than those with low scores. There is also some evidence that these same differences hold for supposedly normal adults, and that when adult physiological data are submitted to the same form of analysis, a factor not essentially different from Factor Nu will be found.

In the near future we hope to have evolved a more refined test battery with

greater diagnostic and predictive value than this one probably affords, as well as a shortened and simplified test battery for clinical use. It is believed that in the not too distant future it will be possible to assay the autonomic balance of an individual with little more difficulty than that with which his basal metabolic rate is now determined.

Summary

To summarize the report briefly, the Eppinger and Hess hypothesis has been slightly reworded as follows:

A. The differential chemical reactivity and the physiological antagonism of of the adrenergic and cholinergic branches of the autonomic nervous system permit of a situation in which the action of one branch may predominate over that of the other. This predominance, or autonomic imbalance, may be phasic or chronic, and may obtain for either the adrenergic or the cholinergic system.

B. Autonomic imbalance, when measured in an unselected population, will be distributed continuously about a central tendency which shall be defined as autonomic balance.

The hypothesis has been tested by measuring the physiological status of 62 children 6 to 11 years of age, for twenty physiological variables, twelve of them supposedly mediated at least in part by the autonomic nervous system; and by intercorrelating the resulting data. Positive intercorrelation among most of the appropriately reflected autonomic functions, and further evidence of their communality from a factor analysis, lends support to the first portion of the hypothesis. For 48 of these children, scores for the autonomic factor are shown to be quite consistent over periods of at least a year, and best measured in terms of a multiple regression equation derived from the factor analysis. These regression scores are regarded as measures of autonomic balance and are found to distribute themselves symmetrically about a central tendency. Support is thus afforded the second portion of the hypothesis which defines the central tendency of the distribution as autonomic balance.

The seven-test and its regression equation is offered as the first, though tentative, quantitative, weighted scale for the measurement of individual differences in the autonomic nervous system.

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PSYCHOSOMATIC MEDICINE—VOL. III, NO. 4, OCTOBER, 1941

ORIGIN OF A WHEALING RESPONSE TO COLD*

HAROLD A. ABRAMSON**

THIS IS A REPORT on a patient who, in the summer of 1940, suddenly developed frequent attacks of hives, the origin of which was unknown. On investigation of the circumstances occurring incidental to the appearance of the hives, it was shown that the hives consisted of a whealing response to cold. On the basis of the case history and laboratory data, it appears that in this case of a whealing response to a physical agent, emotional factors played an unanticipated rôle in the pathogenesis of the whealing response.

PRESENT ILLNESS

The patient was a married woman, 31 years old. Her present illness began on July 20, 1940 when the patient went in swimming. On coming out of the water and drying herself as usual on the float in the sun she discovered that she was "pink and itchy." This had never occurred before. She went into the water again to cool off but on coming out found that she was covered with small welts on the arms, legs, and bosom. Apparently at that time no hives formed where the bathing suit covered the skin. The patient went in swimming for the third time on that day with the development of a skin reaction which was even more severe. Giant hives formed all over the legs especially on the inside of the thighs. They were less marked on the arms.

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** From the Medical Services of Dr. George Baehr and the Laboratories of the Mount Sinai Hospital, New York City and the Biological Laboratory, Cold Spring Harbor, Long Island.

The patient felt slightly dizzy on going in swimming the second time but she lay down and recovered in a few minutes.

When the patient went in swimming a few days after the first attack of hives, there was considerable skin discomfort but she kept on swimming until the irritation became so great that she had to leave the water. She had remained in the water about ten minutes. On coming out of the water she noted large hives especially marked on the legs and thighs. There was slight dizziness, but the main symptom was itchiness. Note that there was no anxiety, no fainting feeling, or feeling of impending collapse. The significance of this will be emphasized in the discussion.

On the fourth occasion that the patient went in swimming, no hives formed but the skin got red on contact with the water. After she had been swimming for ten minutes, the itching was severe enough to cause the patient to get out of the water. She became emotionally upset and started to run to her room but fainted on the way. It is noteworthy that the reaction in this instance was unaccompanied by hives but was accompanied by itching and redness. During the remainder of the time (eight weeks) which was spent on Long Island Sound, hives always formed on swimming if the immersion period was particularly long. The patient also noticed now that on washing with cold water, scattered hives would form. This had never occurred prior to the first attack.

PAST HISTORY

There was no history of asthma, hay fever, or eczema by the patient. She had been married nine years and there was one child, living and well. The child is bright, vivacious, and shows no signs of allergy. Her husband, who is also living and well, had an attack of hives approximately one week before the onset of the hives in the patient herself. The husband believed his hives followed the ingestion of crab and beer and thinks that he is sensitive to crab. He has had previous attacks of hives. Her father died of cancer sixteen years ago. Her mother is living and well. Past history was otherwise irrelevant.

PERSONAL HISTORY

The patient was an artist. She neither drank nor smoked excessively. There was no drug addiction. To her knowledge she had no drug idiosyncracies. Menstrual periods were essentially normal. The hives were not associated with her menses or with the ovulation period.[1]

PHYSICAL AND LABORATORY EXAMINATION

Nothing abnormal was found on physical examination. Blood count and urine were negative. There was no eosinophilia. Blood pressure was normal.

TEST FOR HYPERSENSITIVENESS

Intracutaneous tests with a routine group of inhalants and foods were negative and indicated that the patient did not belong to the group of constitutional hypersensitiveness. That is, she was not atopic.

There was no marked dermographism nor was there any electrical urticaria (electrical urticaria to be described in a subsequent communication is here defined as a whealing response following the application of a direct current density of 0.5 ma/cm^2 with the positive pole or 0.3 ma current density with the negative pole).

It was not obvious at first that the hives were caused by temperature changes. The act of immersion in water for example could have been a primary factor in hive production. In order to definitely classify the case as one of a whealing response to cold, the patient was tested with a standard cold stimulus. A test tube $\frac{1}{2}$ inch in diameter, open at both ends, was fitted at one end with a piece of metal to the rim of the tube and fixed with Duco cement. The tube was filled with cracked ice when tests were to be made. In this way, a fairly constant temperature was applied to the skin through the medium of the metal. Well formed wheals corresponding in shape, without pseudopods, to the circular form of the metal base of the tube developed after as short a period as 1 minute of application of a standard stimulus. The maximum height of the wheal after 1 minute of application of the stimulus was approximately 1 mm. Much larger wheals with marked spreading without formation of pseudopods occurred after 5 minutes of application. In Figure 1 is a photograph (x3) of the edge of the wheal formed by application of the standard stimulus just described. Note, in spite of the marked height of the wheal, there is no pseudopod formation.

PSYCHOSOMATIC APPROACH

The fact that cold had not previously caused whealing raised this question. Why had the onset of this response occurred at this particular time, that is, on a certain day after swimming?

The following data were obtained with the cooperation of the patient and are published with her permission. During the whole summer of 1940 incidental to the war in Europe she was upset considerably. In the summer pre-

[1] The writer has observed a case of ovulation edema.

ceding the outbreak of the war, the writer saw the patient frequently in a social way. A definite change in personality occurred after the summer of 1939?

Whereas last summer (1939) she was gay and vivacious and more or less enjoyed life, this summer (1940) there is a definite tendency to be much upset by war reports. Three friends for whom she has had a special esteem were actively engaged in the British and French Navies, two in the submarine service and one on the French battleship, *Bretagne*, which was sunk before the present illness. Although the reports of the sinking of two submarines, each with one of her friends, occurred subsequent to the whealing response to cold, the death of one friend on the *Bretagne* at Oran occurred shortly before the abnormal response to cold was manifested.

Before the incident to be described occurred, the patient had been going in swimming regularly in a harbor on Long Island Sound with no untoward symptoms or signs. The temperature of the water varied between 70 and 74°. It did not change much during the period covered by this report. The water in the harbor is nowhere deeper than 9 feet at the most. It drains out at low tide so that the bottom is readily visible between high tides. The bottom is muddy. The community waits for high tide before swimming. On the 19th of July, the day before the patient developed hives, the following disturbing episode took place. The patient went in swimming as usual and swam out with the definite object of reaching a small boat moored in the harbor which was about 50 yards from the float. She had never swum so great a distance but she was accompanied by a woman friend who was an excellent swimmer. Her husband was seated in the boat watch-

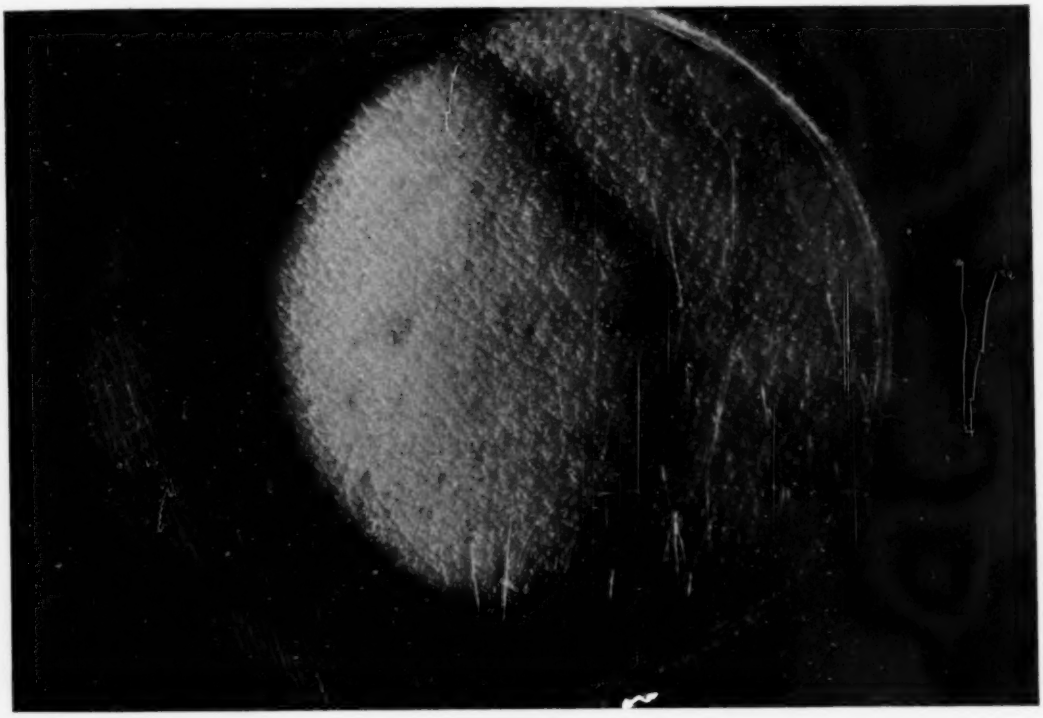

FIG. 1. Whealing response to cold produced by a standard stimulus. Note the absence of pseudopods. Magnification ×3.

ing her progress. On the way, she shouted to her husband, "Look away, X, or I'll go under." Her husband had to look away before she could continue swimming. She stated, "It was just self-consciousness, nothing else. If I can't do anything well, I am very self-conscious about it. It took me years, for example, to drive a car." She finally reached the boat but she was practically "at last gasp because of embarrassment." She rested a short while on the boat and then started to return to the float accompanied by her friend. On the way back she felt that the distance back to the float was a very long distance, indeed. There were many people swimming about who spoke to her, but she felt anxious that she could not complete the distance. She "had a feeling of anxiety without knowing why." "I never have liked anyone to speak to me while I am in swimming." After some difficulty, presumably because the people about her did not believe that she was having trouble swimming back to shore, someone said to her, "Which way are you going?" "I laughed, got a mouthful of water and went down. I came up, refused help and said it was too silly, and tried to swim by myself and went down again." This time the patient could no longer swim and had to be taken to shore. She was easily helped to shore without much trouble by the friend who had been swimming along with her all the time. She stated (one month later), "I started crying and ran straight into the house" (a hundred yards away). She remembers no hives or skin reaction whatsoever on that day, July 19. Her first attacks of hives began after swimming the next day (July 20).

Although the patient believed herself to be well adapted to her environment, she was, on the other hand, sensitive to it and to the responses of individuals to her and to her own work. She was somewhat ambitious but apparently took pride in the perfection of her own work and in doing what she herself would like to do. She was gay and vivacious; but on the other hand, this was sometimes used as a shield for a very keen perception which was particularly found in the type of personality and occupation represented by the patient.

The patient stated that she was, in a sense, a hypersensitive type because she fainted easily and did not like the idea of skin tests. On further questioning, however, she retracted the statement that she fainted easily and said that she did not really faint easily but "a sudden shock will cause prolonged periods of crying." She had, however, fainted before the onset of the present illness. The patient, herself, emphasized that anything sudden might produce emotional upset. "If someone is suddenly rude to me, I am finished. If I tumble down the stairs, I might not be hurt but would cry." She formerly wept easily and was subject to emotional upsets but has improved in the last few years.

After discussing the onset of the symptoms, the patient stated that a good many incidents relative to the development of the syndrome described did not become clarified until our discussion six weeks later. One evening thereafter she *volunteered* the following information. She stated that while swimming toward shore on the 19th of July, the day previous to the occurrence of the hives (the day when she had nearly drowned) she had really felt that she had wanted to drown. She stated that she felt that she didn't deserve to live while her friends serving in the armed forces, younger than she, possibly more useful to humanity than she, had to die while she remained alive. She was quite certain that this conflict

existed during the two times that she "went down."[2]

Discussion

The striking feature is the suddenness of the onset following a period of mental conflict which endangered the patient's life. Since an immunological mechanism always involves the presence of a complete or partial antigen and since there is no type of sensitization discovered in the case in question other than what one could call the presence of a sensitized state psychologically, it is not apparent how one may think of the whealing response to cold described here as similar to the allergies. Rather, one must look here for a psychological pattern which can change the physiological processes in the system, as in this case, suddenly, in such a way that there is both a qualitative and a quantitative change in the response of the vessels of the skin to the stimulus of cold. Although it may be argued that some immunological reactions of the patient might have been altered, it is not likely that any known immunological mechanism is primarily involved in the whealing response to cold itself in this case.

H-substances

On one occasion on which the patient had remained in the water about ten minutes there was a severe skin reaction. In spite of the severity of the skin reaction, there was only slight dizziness present. The main symptom was geneneralized itchiness but there was no anxiety, no fainting feeling or feeling of impending collapse. That is, there was no histamine-like reaction of a general nature.

It has become customary to depend upon a liberation of an H-substance (which has apparently never been isolated from wheals) to account for the explanation of the whealing response in all instances of wheal formation. The absence of pseudopods in the hive (see Figure 1) and the formation of giant hives without constitutional symptoms indicate that the ordinary H-substance theory of wheal formation in cases of this type remains a problem for critical investigation rather than an accepted experimental and clinical fact. A whealing substance with a molecular weight considerably greater than histamine would appear to be responsible for the type of reaction observed (Fig. 1).

Progress in the field of the physical allergies as in this case of whealing response to cold may, perhaps, be expected by critical analyses of case histories with special reference to the inter-retionships between emotional and immunological factors, the onset, and exacerbations. This psychosomatic approach may more probably lead to a greater clarification of the mechanisms involved in cases of this type than a premature inclusion in an allergic group of whealing responses to physical agents.

Subsequent course

The patient is at present living in a cold climate. She has written (January 30, 1941), "Apparently you are quite right about my allergy—for the calmer I become about my friends' death the slighter the trouble. I can put hand or foot in cold water now with no swelling but if I go out in a cold wind, I return looking as though I had been having a bout with Joe Louis. However, it returns more or less to normal within an hour."

Summary

A case of whealing response to cold is

[2] Much of the information presented here was obtained six weeks after the onset of the appearance of the hives and after several friends had died in service in the British Navy.

described. The immunological status was negative. The main feature of the case was the suddenness of onset which immediately followed a relatively short period of mental conflict which endangered the patient's life. Evidence against the histamine theory of "cold allergy" is presented. It is suggested that more accurate data be obtained regarding the nature of the emotional circumstances of the onset of the group of vasomotor responses ordinarily classified as the physical allergies.

I am grateful to Dr. Frank Fremont-Smith for critical suggestions in developing the psychosomatic aspects of this report.

Addendum

The patient has returned from a northern climate with the following details about her loss of whealing response to cold. She said that at first that she was not convinced that the origin of her urticaria was psychological. However, shortly after Christmas she began to develop "a new point of view," made new friends, and gained ten pounds in weight. Thereafter (the complete details are not as yet available) she noticed that she did not wheal as usual. This summer the patient was taken to the same spot in which the conflict discussed in the foregoing was described and swam to the same boat and back to the same pier. There was no evidence of any urticarial response whatsoever. This case, then, represents a spontaneous recovery from a whealing response to cold without the use of histamine or any other so-called desensitizing agent.

PSYCHOSOMATIC MEDICINE—VOL. III, NO. 4, OCTOBER, 1941

PREGNANCY FOLLOWING THE DECISION TO ADOPT

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WHEN A CHILDLESS MARRIED COUPLE announce their plan to adopt a child they not uncommonly hear something like this: "That's fine; now you will probably have one of your own." Stories of couples who had just begun to consider adopting a child, or who had already made plans to adopt, or who had recently adopted a baby when the wife became pregnant either for the first time or after a considerable period of infertility are almost a part of our folklore; certainly they are well known to obstetricians, gynecologists, and general practitioners as well as to psychiatrists. Despite the relative frequency of this phenomenon, however, it is usually dismissed by laymen and by many physicians as a somewhat amusing coincidence.

The psychiatrist, approaching such a case, might well speculate upon a variety of physical, physiological, mechanical, and emotional factors that could be operating in the wife or the husband or both. In many such cases, however, all of the factors except the emotional ones appear to be constant before and after the plan to adopt a child, so that when pregnancy follows it is inferred that the psychological element must have been the most important. The psychiatric and psychosomatic literature contains a number of references to psychological elements in infertility, and some passing comments upon pregnancy following the adoption of a child, but no detailed case studies, so far as I can discover, of the emotional dynamics involved. Such a case has recently come under observation in which both parents were psychoanalytically oriented and in which at least some of the psychological factors are discernible. It may, therefore, be instructive to report this case although the presence of other factors may seem to preclude drawing definitive conclusions.

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THE RELEVANT LITERATURE

The literature up to 1933 has been summarized with adequate citations by Flanders Dunbar (*4*). This consists for the most part in a recognition that sterility may be psychogenic. Kehrer (*5*), for example, in showing that sterility (except in cases of gross anatomical changes, deformities, etc.) is the result of psychic factors, goes on to suggest that this opens an important field for psychotherapy, especially psychoanalysis. A. Mayer (*7*) quotes Sellheim as assuming, in Dunbar's words (*4*, p. 341):

> . . . that psychic influences, associated with a vivid but unsatisfied desire for a child, may stimulate the ovaries to pathological growth. It is possible that this may result in premature maturation of the follicles and discharge of ova which are not yet ready for fertilization, and consequent sterility. He thinks that the peculiar cases of first conception after fifteen or twenty years of married life may be explained in this way by the fact that as the woman becomes gradually reconciled to her sterility this injurious influence on the follicular apparatus disappears.

A similar view was expressed by F. Mohr (*9*) who is also cited by Dunbar as follows (*4*, p. 341–2):

In view of the variety of mechanical and chemical (chiefly endocrinological) processes involved in conception, it is *a priori* almost impossible that psychic factors should not play a rôle. Furthermore, the influence of psychic factors on the endocrines is sufficiently proven . . . thus giving additional justification for the belief that psychically influenced hormonal processes may play a rôle in conception. According to Sellheim, we have to reckon with the possibility of a postponement of ovulation (or the opposite), since with all emotions there is a marked change in the abdominal circulation. This, however, is synonymous with the possibility of favoring or hindering conception.

Recent studies of Benedek and Rubenstein (*2*, *3*) have shown impressive new evidence of correlations between ovarian activity and psychodynamic processes. Although most of the material thus far presented has been limited to methodology and to the correlated findings of independently pursued physiological and psychoanalytic studies, there is nevertheless the suggestion (*3*, p. 484) that psychological factors influenced the gonadal function and (*3*, p. 465) that "sociological factors are extremely important in the adaptation to the biological task of women." At the Ninety-Seventh Annual Meeting (1941) of the American Psychiatric Association, Benedek (*1*) went on to point out that there is a definite interrelation between the psychosexual development of the individual and the hormonal cycles, so that psychosexual fixations or inhibitions may lead to irregularities of gonadal cycles producing a psychosomatic vicious circle.

Karl Menninger (*8*) writing on the unconscious repudiation of femininity in women also quotes Sellheim on the psychogenesis of sterility, noting that he assumes

. . . that the emotional factors are reflected in an overaction of the ovaries resulting in a premature maturation of the follicles, such that ova are discharged which are not yet ready for fertilization. He believes that in some cases this is cured by psychotherapy, in others by a gradual reconciliation of the woman to her sterility, this reconciliation serving to decrease the pathological (emotional) stimulation of the ovary and hence allowing it to discharge normal ova and to terminate the sterility, as when a child is born after a couple had adopted one.

Here we have not only a recapitulation of the belief that emotional factors cause sterility, but also a suggestion as to how the adoption of a child effects a cure. By implication at least, adoption facilitates an emotional reconciliation to the fact of sterility which somehow puts a stop to certain pathological influences upon the ovaries and thus makes pregnancy possible.

Knight (*6*) writing about the problems of selecting and rearing adopted children likewise discusses functional sterility. He says (p. 66):

Since it not infrequently happens that a childless wife does become pregnant some time *after adopting a child*, although the adoption did not take place until the couple were thoroughly convinced conception was impossible, one is led to theorize that unconscious opposition to child-bearing might have been responsible for the functional sterility, and that this unconscious opposition was somehow overcome by the experience of adopting and taking care of a child. How the unconscious opposition to child-bearing might have operated to thwart the conscious attempts to achieve conception is a moot question. One possible hypothesis is that the unconscious of the woman, just as it is known to cause other organ dysfunctions, may affect the physiology of ovulation or implantation in such a way as to prevent conception. Another hypothesis is that there is an unconscious awareness in the woman of the time and fact of ovulation and that she manages to avoid coitus at this critical period, which is the only period

(about three days' duration each month) when conception could take place.

There appears to be strong evidence, therefore, that emotional conflicts may operate in one way or another to cause infertility. The suggestion is made, too, that the adoption of a child somehow resolves such conflicts, in some cases, and thus makes conception possible. We are nevertheless left in the dark as to what the emotional dynamics may be by which the adoption of a child, or the mere decision to adopt as it is in some cases, results in a pregnancy in a previously infertile couple. It is with the hope of supplying an answer in one such instance that the following case is presented.

Summary of Case

The couple in question had been married seven years when they discontinued the use of contraceptives with the conscious expectation of having a child. At this time the husband was 33 years of age, and the wife 31. Both were engaged in professional work, and both continued to work for the next three years, during which time, however, the wife first decreased her work half-time and then stopped entirely a few weeks before taking a baby for adoption.

Mr. A. was in good physical health throughout the entire ten year period of marriage. He had over 500 hours of psychoanalysis between the years 1935 and 1940 during which, although material related to strong sibling rivalry had been unearthed, no evidence of unusual anxiety or hostility with respect to fatherhood appeared. A need to remain emotionally dependent upon the wife (as a parent-figure) was evinced in a tendency to encourage her to keep on working and this, as will appear shortly she keenly felt and resented because of its implications for her.

When Mrs. A.'s failure to become pregnant became a problem, both husband and wife were examined. In repeated seminal fluid examinations, the husband was found to be at first markedly, but subsequently only slightly under par in term of sperm motility and the presence of abnormal forms. Several months of intensive Vitamin E therapy (wheat germ oil) in 1939 effected some favorable changes in decreasing the percentage of abnormal forms. After a similar examination in 1940, large doses of Vitamin B complex were tried, but had been taken only a few weeks when the wife became pregnant.

Mrs. A. was likewise in good physical health throughout the early years of marriage, but remained somewhat underweight. Between 1932 and 1940 she also had over 500 hours of psychoanalysis, the pertinent findings of which will appear in the ensuing discussion. During the period of three years (1937–1940) when the couple actively attempted to have a child, a change in climate and locale enabled the wife to gain weight and get more rest so that, superficially, she was as healthy as she had even been.

The first gynecological consultation to determine the reasons for infertility (fall of 1938) revealed, however, a pelvic endometriosis. Despite this, both Fallopian tubes were found to be patent (Rubin test) and the possibility of a pregnancy was still held out. During the summer, in an effort to "do something," another physician prescribed the pituitary extract, prephysin, of which one ampoule was given every third day for a series of ten or twelve, followed by a rest, and then another series. This treatment was interrupted, however, in a few months (fall of 1939) by the onset of acute pelvic symptoms. These led to a laparotomy at which time the endometriosis was found to be

almost exclusively on the left side of the pelvis. The left ovary and tube were removed, but the right ovary and tube appeared healthy and were left intact. Recovery from this operation was rapid and there were no further symptoms.

One year and one month after this operation, the couple decided to adopt a child. From this point on, the chronology is interesting and significant. It may be outlined as follows:

December 1: The couple consulted a gynecologist about adoption. He suggested several agencies, and prescribed Vitamin B complex for Mr. A.

December 2: An application was secured and filed with a child placement agency.

December 3: Mrs. A. notified her office of the plan to adopt a baby and to quit her job on January 10.

December 13: Onset of what proved to be wife's last menstrual period.

December 17: The couple had an interview with a supervisor of the child placement agency and heard about a baby available for almost immediate placement.

December 28 and 29: The couple saw this baby in agency offices and the wife visited the baby several times in its temporary boarding home; the couple told the agency they would like to take this baby.

January 10: Mrs. A. stopped work; pregnancy was definitely suspected and was subsequently confirmed by a gynecologist.

January 21: The couple took adoptive baby, six months of age.

It is impossible to state when conception occurred. If ovulation took place "normally" around the thirteenth day after the onset of the previous menstrual period, conception may be dated sometime between the time the couple first heard about the adoptive baby and the time they first saw him. It is equally possible, however, that with a somewhat delayed ovulation, conception was not until after they had seen the baby and definitely informed the agency of their desire to take him. It should perhaps be added that the agency social workers described the adoptive baby in the most glowing terms as one of their most attractive and promising babies, and that the couple were enchanted with their first impressions of him and highly pleased at the prospect of taking him within a few weeks.

Psychological Material

The advent of pregnancy so soon after the decision to adopt a baby leads us to ask for further details about possible psychological factors. Material from Mr. A. does not appear to be significant. He feels that he had long since given up a considerable amount of his excessive dependence upon his wife. He was anxious for her to have a baby, and advised her to keep on working half-time only on the grounds that she herself had expressed a distaste for full-time housekeeping and that she needed outside intellectual interests. In this advice, the wife's analyst had concurred.

Material from Mrs. A. is apparently more significant. She was the second of three girls and her parents, especially the father, very much wanted a boy. When she, as the second child, turned out to be a girl, the mother felt obligated to compensate to the father for not giving him a boy by treating her second daughter as a boy. She was made to wear tailored clothers, her boyish figure was praised, and she was encouraged to express her athletic abilities, as in being singled out to play golf with her father.

The wife's crucial analytic material hinged on the feeling, not that she wished to be a boy (penis envy), but that she was not permitted to be a girl. She felt that to become a woman would

constitute a betrayal of her mother to whom it meant so much to be able to give a "boy" to her husband, Mrs. A.'s father. Out of this came secondary feelings of insecurity; she could not have a child because she was not enough like a woman, and she had no confidence that she could care for a child were she to have one.

Tied up with this need to be a "boy" to please her parents was an emphasis, in the family, upon working, being independent, and being self-supporting. This was especially related to the father-identification, so that working was unconsciously equated with being masculine. When, therefore, Mrs. A. was compelled to work after marriage and especially when she was encouraged to do so by her husband, she found herself in a parental transference situation with her husband which, to her, meant: "You must go on being like a man." When her analyst appeared to reenforce this by suggesting that she might as well continue to work part-time until she became pregnant, it seemed to her that he too demanded that she remain masculine.

Mrs. A. thus found herself in a vicious circle: If she stopped work before becoming pregnant she would feel guilty toward her husband (and her analyst) as parent-surrogates; but she could not become pregnant while working because of the identification of work with masculinity. Associated with this was a good deal of resentment toward her work, for what it represented, and toward her husband, as a parent-figure, for forcing her to continue in the masculine role. It is interesting that Mrs. A. was able to become only partly aware of this in analysis; she became completely aware of it after the vicious circle was broken by the decision to adopt a baby and the related plan to stop work on a definite date. It seems significant that she became pregnant within a few weeks of bringing these decisions at least to the borderline of concrete reality.

It should be added that Mrs. A., contrary to the suggestions of some writers cited above, states that she did not abandon the hope of becoming pregnant and thus become reconciled to her infertility. She recalls that even while talking to social workers at the child placement agency about adoption she expressed the hope that she might become pregnant later, and asked the social worker whether that would make any difference in the adoption. She even joked with the worker about other couples who had adopted a baby and then had a child of their own.

Discussion and Conclusions

How are we to evaluate the relative importance in this case of physical and psychological factors? Certainly one must avoid the error of the mother who had her daughter's congenitally dislocated hip corrected by an orthopedic surgeon and then marched her down the aisle of the church to demonstrate what Christian Science had done for her! In the present case, the gynecologist might wish to point out that the removal of masses of endometrial tissue from the pelvis might well have contributed to the outcome.[1] A psychoanalyst might ask, in return, whether the endometriosis itself might not have been a somatic expression of an uncon-

[1] A draft of this article was sent to the gynecologist who operated upon Mrs. A. A summary of his comments follows: "All of us have observed pregnancies shortly after the adoption of a child and I believe that most of us realize that there must be a psychologic factor responsible. . . . It is possible that you have underestimated, in your report, the influence of the decision to adopt on the husband. From my point of view the infertility was as much the husband's problem as the wife's. . . . Possibly the short interval that elapsed between the decision to adopt and impregnation is the weakest point in your presentation. It was only a matter of three weeks and the 'release' must have been exceedingly prompt and complete."

scious need to "destroy" the patient's femininity.

Of course this cannot be considered a crucial case, but neither need it be thought of entirely on an "either-or" basis. Psychosomatic research has taught us that what we call "physical" and "psychological" are but different manifestations of processes affecting the total personality. Certainly we no longer think of endocrine or many other physiological processes as operating independently of the emotions. The fact that one element or set of elements may be present in this case does not, therefore, exclude all others.

Whatever the physical or mechanical effects of the operation, then, and whatever the influence of hormonal or vitamin preparations in the husband, the wife, or both, it seems clear that the emotional factors were equally important, if not predominantly so. A type of repudiation of femininity existed in the wife under pressure of strong unconscious anxiety, and the vicious circle described above operated to keep the anxiety alive and to preclude pregnancy. The decision to adopt a child broke the vicious circle because it created a legitimate and necessary reason for the wife to quit her job. This served immediately to lessen her hostility toward her husband and toward herself in the masculine role, and by the same token, it enabled her better than ever before to turn toward and accept her basic femininity. This case, then, appears to illustrate the psychodynamics of one instance of pregnancy in the wife of a previously infertile couple following the decision to adopt a child.

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Periodical Literature

Kenyon, V. B., Rapaport, D. and Lozoff, M.: Note on Metrazol in General Paresis; Psychosomatic Study. *Psychiatry*, 1941, vol. 4, p. 165.

1. The theoretical situation concerning the psychology of general paresis is described; the few convergent and more divergent points are discussed. It is pointed out that while the points of agreement show the possibility of psychological understanding, the points of disagreement, especially concerning the role of the dementia, might yield valuable information on psychosomatic inter-relations in general paresis.

2. An experiment using metrazol in general paresis is reported. Some specifically treated (three out of twelve) and untreated (two out of four) patients responded with good improvement to this drug, hitherto used only in the functional psychoses.

3. The similarity in the reactions of paretics to very different therapeutic agents, such as hyperpyrexia, sodium amytal, and metrazol are considered as indicative of the important role which psychogenic factors play in the paretic psychosis.

4. Results of the psychological tests (Rorschach, Babcock, and Szondi) administered to forty-three paretics are discussed. The test results appear to contribute affirmation of the psychogenic theory, and to give preference, in general, to the Hollos-Ferenczi theory, and partially to the Schilder theory on the psychology of general paresis.

5. Further investigation by the use of drugs, psychological tests, and comparative researches on the psychology of the luetic are suggested for the further clarification of the many problems involved.

6. The method of using drugs and psychological tests as variations of the experimental situation is suggested as a method for psychosomatic research.

Miller, Milton L. and McLean, Helen V.: The Status of the Emotions in Palpitation and Extrasystoles with a note on 'Effort Syndrome.' *Psychoanalytic Quarterly*, 1941, vol. 10, p. 545.

After quoting a delightful case report from the tenth century and after the mention of a dream by Freud, the authors report about four cases of palpitation and extrasystoles in patients undergoing anxiety. This syndrome was observed when the patients' defenses had been worked through and the strong competitive attitude towards the parent of the same sex appeared. In each case the patients gave the impression that the parent of the same sex represented an overwhelming, fearful adversary with whom they had always unconsciously been engaged in a desperate struggle—a struggle which they wished to avoid at all cost because this parent was also unconsciously a loved person; in life they expressed this love in the form of a strongly submissive attitude. To submit rather than to fight was the keynote of their lives.

French, Thomas M.: Physiology of Behavior and Choice of Neurosis. *Psychoanalytic Quarterly*, 1941, vol. 10, p. 561.

A dream which is reported in detail pictures vigorous muscular activity on the part of the patient's mother and seems to represent the patient himself as being beaten upon an anvil. It seems like a continuation of the dream when in the next hour the patient reported the development of lumbago. A week later he complained of a stiff neck so painful that he could talk of little else. This dream is taken as an illustration for the fact that symptoms resulting from the frustration of an activity may involve especially the organs which are most active or most under tension at the moment of frustration. It is suggested to discard as unimportant the old and meaningless controversy as to whether the energy that is shoved about in displacement processes is of sexual nature or not. It is much more important to recognize that these displacements of energy are really of functional significance.

M. G.

Book Review

French Lois Meredith: *Psychiatric Social Work*. The Commonwealth Fund, New York. Humphrey Milford, Oxford University Press, London, 1940. 359 pp., $2.25.

This book presents a comprehensive and authoritative study of the growth and present status of psychiatric social work. The study was conducted under the supervision of the Advisory Committee on Standards of the American Association of Psychiatric Social Workers, with the aid of a grant from the Commonwealth Fund. The data on which the study is based were brought down to 1938. After a preliminary analysis of the rôle of social work in relation to psychiatry the author traces the historical development of this type of work. The present status and scope of psychiatric social work are then presented, with a discussion of its major variations. There is a full description of the special adaptations and functions in such characteristic settings as mental and general hospitals, child guidance and mental hygiene clinics, public health nursing organizations, educational institutions and mental hygiene education. This description is enlarged through the use of considerable statistical material, relating mainly to the movement of personnel from one setting to another. A section of special interest to the readers of this journal deals with trends in social treatment, including an analysis of the various techniques employed by psychiatric social workers as the work has developed. The final chapter gives a full discussion of professional education for psychiatric social work. There is a history of the professional association, the American Association of Psychiatric Social Workers, in the Appendix.

This study is significant not only because it gives the clearest picture of psychiatric social work yet presented but also because it shows so well the problems and processes involved in the definition of a professional service. Social work as a whole is at this time engaged in defining its appropriate functions. The problems involved in such definition have been particularly acute in the psychiatric field, due to the rapid growth of the work and the experimental excursions of its members into many areas. The study shows that at one period less than half of the members of the professional association were employed in strictly psychiatric agencies. As a result there developed two conceptions of psychiatric social work, the first stressing its identifying feature as a working relationship with a psychiatrist, the second defining it as intensive social case work with emotional problems in any type of agency. The latter definition developed as psychiatric social workers moved into family and child welfare agencies to work with the more complex problems of personality. In the earlier days there was an obvious distinction between the approach and skills of the psychiatric social worker and the performance of other workers; but as the psychiatric content in the education of all social workers has increased, this difference is no longer so marked. For some years psychiatric social workers as a group have been struggling with the difficult and controversial questions presented to them by this situation. The most recent position of their representative body is that taken in this book, namely, that psychiatric social work is a form of social work practiced in connection with psychiatry. Probably because of this approach the book does not deal with the important activities of psychiatric social workers in family and child welfare agencies. While this decision is logical and it was undoubtedly necessary to set some limits to the study, the reader is left with the impression that there are important issues regarding this whole problem of professional function that are yet to be presented.

Harriett M. Bartlett

NOTE

THE SALMON COMMITTEE on Psychiatry and Mental Hygiene of the New York Academy of Medicine announces the Thomas William Salmon Lectures for 1941 to be given by Dr. Robert Dick Gillespie, Psychiatric Specialist with the British Royal Air Force,* on the subject "Psychoneuroses in Peace and War and the Future of Human Relationships."

New York

Monday, November 17th and Tuesday, November 18th at 8:30 o'clock, Hosack Hall, New York Academy of Medicine, 2 East 103rd Street. Sponsored by: The Salmon Committee on Psychiatry and Mental Hygiene; Dr. Winfred Overholser, Chairman, Committee on Neuro-Psychiatry, of the National Research Council; Dr. James K. Hall, President, American Psychiatric Association; Dr. C. Macfie Campbell, President, American Board of Psychiatry and Neurology; Dr. Louis J. Pollock, President, American Neurological Society.

Toronto

Wednesday, November 19th, at 8:30 o'clock, Convocation Hall, University of Toronto. Sponsored by: The Salmon Committee on Psychiatry and Mental Hygiene; The National Committee for Mental Hygiene of Canada; The Toronto Academy of Medicine; The University of Toronto.

Chicago

Friday, November 21st, at 8:00 o'clock, Thorne Hall, Northwestern University, Lake Shore Drive and Superior Street. Sponsored by: The Salmon Committee on Psychiatry and Mental Hygiene; The Chicago Institute of Medicine; The Chicago Neurological Society; The Illinois Psychiatric Society.

* Dr. Gillespie will travel and lecture in a civilian capacity.

New Orleans

Saturday, November 22nd, at 8:30 o'clock, McAlister Auditorium, Tulane University. Sponsored by: The Salmon Committee on Psychiatry and Mental Hygiene; The Louisiana State Medical Society; The Tulane University of Louisiana School of Medicine; The Louisiana State University School of Medicine; New Orleans Society for Neurology and Psychiatry; The New Orleans Parish Medical Society; Southern Psychiatric Association.

Washington

Monday, November 24th and Tuesday, November 25th, Conferences with Army and Navy officials *Not open to the public unless otherwise specified.* Sponsored by: The Salmon Committee on Psychiatry and Mental Hygiene; Joint Army and Navy Committee on Recreation; Morale Branch of the War Department.

San Francisco

Thursday, November 27th, at 8:15 o'clock, Lane Hall, Stanford University School of Medicine. Sponsored by: The Salmon Committee on Psychiatry and Mental Hygiene; Leland Stanford University; San Francisco Psychiatric Society; The University of California.

Philadelphia

Sunday, November 30th, at 3:00 o'clock, College of Physicians of Philadelphia. Sponsored by: The Salmon Committee on Psychiatry and Mental Hygiene; The College of Physicians of Philadelphia; The Weir Mitchell Oration.

Dr. Robert Dick Gillespie, Psychiatric Specialist with the British Royal Air Force, is the author of the standard reference work "Textbook of Psychiatry" written in collaboration with Dr. David K. Henderson. Before he undertook his wartime duties, he was on the psychological medicine staff of Guys Hospital and Medical School in London.

A native of Glasgow, Scotland, Dr. Gillespie received his Medical Degree from the University of Glasgow and his Diploma of Psychological Medicine from the University of London. He was a Pinsent Darwin Research Student.

Dr. Gillespie was Examiner in Psychiatry at the University of London and the McNeil Lecturer in Psychopathology at the University of Aberdeen. He is a fellow of the Royal College of Physicians, a member of the British Psychological Society, the British Medical Society, the Royal Society of Medicine and the National Council for Mental Hygiene.

One of Britain's leading psychiatrists, Dr. Gillespie is known in this country. He was formerly a member of Henry Phipps Psychiatric Clinical Staff of Johns Hopkins Hospital and a member of the faculty of Johns Hopkins University. He is a member of the American Psychiatric Association.

The Salmon Committee on Psychiatry and Mental Hygiene appointed by the New York Academy of Medicine, each year selects as the Salmon Lecturer the outstanding specialist in psychiatry, neurology or mental hygiene who has contributed most to his field during the preceding year.

The Salmon Lectures for the advance of psychiatry and mental hygiene are designed as a permanent contribution to the field of medicine and are published in book form.

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